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2-14-2023

2023 JSU Student Symposium Proceedings

Shannon Robertson

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1 JACKSONVILLE STATE UNIVERSITY STUDENT RESEARCH SYMPOSIUM

From its 1995 inception in the College of Arts and Sciences, the Symposium has served to highlight the creative activities of JSU students. Beginning in 2017, the Symposium was extended to include the entire university. It is the intent of the Symposium to provide a forum to publicly display and acknowledge the best work of our students.

The faculty members who have provided guidance and mentoring to the student presenters are to be commended for their dedication. By spending many hours both inside and outside the classroom introducing students to research activity, these professors are investing in the future.

These student participants, by choosing to go beyond the requirements and limits of the classroom, have demonstrated an understanding of the importance of expanding and adding value to their educational experience. We are proud of their initiative and accomplishments.

Thank you for attending the Symposium and supporting our faculty and students in this endeavor.

Dr. David Thornton, Symposium Chair

2 PROCEEDINGS

2.1 MONDAY, FEBRUARY 13, 2023

2.1.1 MORNING SESSION (8:00 – 11:25; ROOM 1101C)

8:00-8:10 Paper (UG)

Dakota Heathcock (Lori Owens – Mentor)

Religion, Race, and Rights: An Analysis of the Political and Economic Atmosphere of the Southeastern United States from 1776 to 2022

8:15-8:25 Poster (UG)

Tim Gaskins (Saeideh Gharehchahi – Mentor)

Air Pollution and Asthma Equity Index in Alabama

8:30-8:40 Paper (GR)

Tiffany O'Dell (Arup Ghosh – Mentor)

Online Threats vs. Mitigation Efforts: Keeping Children Safe in the Era of Online Learning

8:45-8:55 Paper (GR)

Gabrielle Davis and Sara Morris (Ashley Turner – Mentor)

*An evolutionary comparative study of congenital stationary night blindness associated TRPM1 genetic variants of uncertain significance in humans and horses utilizing *Caenorhabditis elegans**

9:00-9:10 Paper (UG)

Vaderick Fowler (James Rayburn – Mentor)

*The use of *Xenopus* embryos for determining the developmental toxicity of Acid fuchsin.*

9:15-9:25 Demonstration (UG)

Montell Norman, Megan Kamholtz and Martell Norman (David Thornton – Mentor)

SCP-5999 (A VR horror game)

9:30-9:40 Demonstration (UG)

Tyler Gallahar (Falynn Turley – Mentor)

Business Information: Excel Dashboard

9:45-9:55 Demonstration (GR)

Conner Gayda (Chad Anderson – Mentor)

Typography, Baseball, and the Fight for Civil Rights

10:00-10:10 Paper (GR)

Tamicha Ingram (Jennifer Savage and Christopher Clark – Mentors)

Attention Deficit Hyperactivity Disorder Management in Collegiate Athletes: A Critically Appraised Topic

10:15-10:25 Paper (GR)

Justin Files (Jennifer Savage and Christopher Clark – Mentors)

Blood Flow Restriction Improves the Rehabilitation Process in Anterior Cruciate Ligament Reconstruction Among Collegiate Athletes: A Critically Appraised Topic

10:30-10:40 Paper (GR)

Micah Glover (Jennifer Savage and Christopher Clark – Mentors)

Can Helmets Assist in the Reduction of Concussions in Football Athletes, when Compared to Patient Education and Tackling Techniques: A Critically Appraised Topic

10:45-10:55 Paper (GR)

Cole Ivey (Majid Koozehchian and Gina Mabrey – Mentors)

Impact of Probiotics on Exercise Performance

11:00-11:10 Paper (GR)

Gemini Sigler (Majid Koozehchian, Kory Hill and Gina Mabrey – Mentors)

Nutrient timing: An effective approach to enhanced athletic performance, recovery, and training adaptation

11:15-11:25 Paper (GR)

Kennedy Gavin (Majid Koozehchian, Kory Hill and Gina Mabrey – Mentors)

Protein & Exercise

2.1.2 BREAK (11:30 – 1:15)

2.1.3 AFTERNOON SESSION (1:15 – 4:55; ROOM 1101C)

1:15-1:25 Paper (UG)

Alexandria Quintero (Helen Kaibara – Mentor)

Pushing Perfection & Pain: How the 'Model Minority' Myth Harms Asian Americans

1:30-1:40 Paper (UG)

Chase Capes (Tanya Sasser – Mentor)

The Psychology of The Scarecrow: Looking at What Makes Scarecrow The Scarecrow

1:45-1:55 Paper (UG)

Sarah Yarbrough (Teresa Reed – Mentor)

Comparison of “Out Out--” and “Ballad of Birmingham”

2:00-2:10 Demonstration (GR)

Caycie Trotter (Seth Johnson – Mentor)

MoonBerry Farms

2:15-2:25 Paper (UG)

Sara Adkinson (Jianping Huang – Mentor)

The CBD Industry: A Silent Growing Giant

2:30-2:40 Paper (UG)

Christopher Vest (Mark Sciuchetti and Falyynn Turley – Mentors)

The Decline of Retention at Jacksonville State University

2:45-2:55 Paper (UG)

Anthony Wapshott (Grover Brown – Mentor)

How an invasive Asiatic clam species effects the morphology of sternotherus odoratus

3:00-3:10 Paper (UG)

Matthew Glavosek (Monica Trifas – Mentor)

Image Processing in Python

3:15-3:25 Poster (UG)

Macee Glick (Jenna Ridlen – Mentor)

Expression of H284Y Variant of TCF4 in the Expression of Pitt-Hopkins Syndrome

3:30-3:40 Poster (UG)

Taylor Mabry, Jordan Peters, Marli Hanks and Auslyn Russell (Ashley Turner – Mentor)

Genetic assessment of systemic lupus erythematosus associated TREX1 variants of uncertain significance in C. elegans

3:45-3:55 Poster (GR)

Tanner Vandever, Alexis Petty and Elise Patrick (Ashley Turner – Mentor)

Investigation of BMAA modulation of A β -mediated neurodegeneration in transgenic Caenorhabditis elegans

4:00-4:10 Paper (GR)

Tabitha Rayburn (Vicki Tinnon-Brock – Mentor)

Genshin Impact: A Case Study of Virtual Biogeography

4:15-4:25 Paper (GR)

Jhanvi Patel, Josemanuel Mendez and Sajana Vangala (Monica Trifas and Arup Ghosh – Mentors)

Cloud Computing and its role in education during covid-19 pandemic

4:30-4:40 Paper (GR)

Hannah Davis (Jason Cleveland – Mentor)

Fastest Velocity: JSU Fastballs

4:45-4:55 Poster (UG)

Hannah Cornett (Cerilla Roe – Mentor)

Analysis of Student Learning Through Elegiac Writing

2.2 TUESDAY, FEBRUARY 14, 2023

2.2.1 MORNING SESSION (8:30 – 11:00; ROOM 1101C)

8:30-8:40 Paper (GR)

Edzer Mauger (Majid Koozehchian – Mentor)

Exercise and Fluid Replacement

8:45-8:55 Paper (GR)

Will Bernhardt (Majid Koozehchian, Gina Mabrey – Mentors)

β-Alanine Supplementation and its Effect on Sports Performance

9:00-9:10 Paper (GR)

Greta Romei (Majid Koozehchian, Gina Mabrey – Mentors)

The Effectiveness of Caffeine in Exercise Performance

9:15-9:25 Paper (GR)

Chandler Ingram (Christopher Clark and Jennifer Savage – Mentors)

Ankle Injuries & Athletic Training Coverage in Marching Band: A Critically Appraised Topic

9:30-9:40 Paper (UG)

Madalyn Stott (Jody Long – Mentor)

Barriers to Justice: the need for American prison reform

9:45-9:55 Paper (UG)

Gracie Dooley (Heidi Dempsey – Mentor)

How is Empathy Correlated with the Big 5 Personality Traits?

10:00-10:10 Paper (UG)

Charles Harrell (Teresa Reed – Mentor)

Restoration of Identity in “Anglikan Seraphym Subjugation of a Wild Indian Reservation”

10:15-10:25 Demonstration (UG)

Brianna Bailey (Chad Anderson – Mentor)

Glad Advertising Campaign

10:30-10:40 Paper (UG)

Brianna Bailey (Christian Dunn – Mentor)

Women in Type

10:45-10:55 Poster (GR)

Drew Watson (Teresa Reed – Mentor)

Wife of Bath: Multifaceted Feminist or Manufactured Misogynist?

2.2.2 MORNING SESSION (8:30 – 11:30; ROOM 1103C)

8:30-8:40 Paper (UG)

Sophia Ajemba (Falynn Turley and William Hankins – Mentors)

Impact of the COVID-19 Pandemic on the Government Sales Tax Revenue

8:45-8:55 Paper (UG)

Victoria Barkley (David Thornton – Mentor)

Gamification Marketplace

9:00-9:10 Paper (UG)

Sudeep Joshi (Arup Ghosh – Mentor)

Using Machine Learning to Predict Laptop Price

9:15-9:25 Paper (UG)

Kritika Maharjan (James Rayburn – Mentor)

A preliminary comparison of Methylene Blue and Phloxine B's developmental toxicity using Xenopus embryos.

9:30-9:40 Poster (GR)

Matthew Reeves (Lori Tolley-Jordan – Mentor)

*Trematode Diversity in Freshwater Snail, *Campeloma decisum**

9:45-9:55 Paper (GR)

Kindall Brown (Lori Tolley-Jordan – Mentor)

The relationship between changing land cover and macroinvertebrate diversity over twenty years in Choccolocco Creek, Northeast Alabama

10:00-10:10 Poster (GR)

Gabriella Gentry (Lori Tolley-Jordan – Mentor)

Detecting global declines of stoneflies at a local scale: measuring changes in stonefly diversity in a tributary of the Cahaba River of central Alabama

10:15-10:25 Poster (GR)

Margaret Walton (Mark Sciuchetti – Mentor)

Using ArcGIS Software and Applications for Community Mapping

10:30-10:40 Poster (GR)

Himani Patel (Ashley Turner – Mentor)

*Genetic analysis of hereditary gingival fibromatosis associated SOS-1 missense variant of uncertain significance in *Caenorhabditis elegans**

10:45-10:55 Paper (GR)

Annie Kelley (Mark Sciuchetti and Jennifer Green – Mentors)

Economic Impact of the Forestry Industry in Alabama: Using Economic Geography to understand geographic impacts on business.

11:00-11:10 Paper (GR)

Shelby Wolfram (James Rayburn – Mentor)

*A comparison of *Xenopus laevis* and *Ambystoma maculatum* embryos for determining the developmental toxicity of sodium fluoride and sodium selenate*

11:15-11:25 Poster (UG)

Cassidy Bolt (Mark Sciuchetti – Mentor)

Toxic Air Pollution in Louisiana

2.2.3 BREAK (11:30 – 1:15)

2.2.4 AFTERNOON SESSION (1:15 – 3:10; ROOM 1101C)

1:15-1:25 Paper (GR)

Andrew Mitchell (Julie Staples – Mentor)

The Effect of Name, Image, and Likeness (NIL) Policies on the Role of College Sports Agents

1:30-1:40 Demonstration (UG)

Riley Abston (Christian Dunn – Mentor)

“The Sign of the Four” Book Design

1:45-1:55 Paper (GR)

Ashley Himmler (Raina Kostova – Mentor)

Krishna, Christ, and the Fullness of Human Life

2:00-2:10 Demonstration (GR)

Brittani Myers (Chad Anderson – Mentor)

Autumn Merchant – Augmented Reality as Illustrative Medium

2:15-2:25 Paper (UG)

Ariya DeVine (Majid Koozehchian, Gina Mabrey – Mentors)

Oral Creatine Supplementation and Athletic Performance

2:30-2:40 Paper (GR)

Rubyn Johnson (Majid Koozehchian, Gina Mabrey – Mentors)

Fluid Periodization: A New Approach to Sports Performance

2:45-2:55 Paper (GR)

Greta Romei (Jennifer L. Savage, Christopher M. Clark – Mentors)

Subthreshold Aerobic Exercise as a Strategy for Concussion Management: A Critically Appraised Topic

3:00-3:10 Paper (UG)

Anshika Mittal (Jianping Huang – Mentor)

Mittal Fruit Products

2.2.5 AFTERNOON SESSION (1:00 – 3:25; ROOM 1103C)

1:00-1:10 Poster (UG)

Hunter Ballard and Alyssa Jones (Jenna Ridlen – Mentor)

Investigation of TCOF1 Variations: An Insight to Treacher Collins Syndrome

1:15-1:25 Paper (UG)

BriAnn Buford (Jenna Ridlen – Mentor)

Gene Variant KLHDC8B and Its Phenotypic Expression in Classic Hodgkin’s Lymphoma

1:30-1:40 Paper (UG)

Summer Kiker (Kathryn Catlin – Mentor)

Discoveries of Feature 904 at the Bains Gap Native American Village Site

1:45-1:55 Paper (UG)

Daythyn Price, Kris McAnally and Adam Parker (Kazi Rahman – Mentor)

Income inequality distribution of the residents of city of Jacksonville, Alabama using Gini index and Lorenz curve

2:00-2:10 Paper (UG)

Barbara Moore (Arup Ghosh – Mentor)

The What and How of QR Codes

2:15-2:25 Demonstration (UG)

Kevin Navarrete-Resendiz, Jakob Skipper and Adam Parker (David Thornton – Mentor)

Lockdown

2:30-2:40 Demonstration (UG)

Jamall James (David Thornton – Mentor)

Kyaku Zero (K-0)

2:45-2:55 Demonstration (UG)

Ryan Eubanks (Arup Ghosh– Mentor)

I Own a Self-Driving Car

3:00-3:10 Paper (GR)

Mausam Parajuli and Syed Shah (Arup Ghosh – Mentor)

Exploring Performance Evaluations of Docker and LXC Container Technologies – Are they good for Cloud Environments and IoT Devices?

3:15-3:25 Demonstration (GR)

Allie Field (Ross Martin – Mentor)

Flood Hazards on Trails

2.2.6 AWARDS CEREMONY (5:00; MERRILL HALL ATRIUM)

3 SYMPOSIUM AWARD RECIPIENTS

A panel faculty and staff judges evaluated the symposium presentations with respect to several criteria. To recognize outstanding achievement, awards were presented for the best presentation in each academic discipline with three or more participants.

Best of Showcase: Anthony Wapshot

Best Graduate Paper: Hannah Davis

Best Undergraduate Paper: Sophia Ajemba

Best Graduate Poster: Margaret Walton

Best Undergraduate Poster: Hannah Cornett

Best Graduate Demonstration: Connor Gayda

Best Undergraduate Demonstration: Riley Abston

Best of the College of Arts & Humanities (Graduate): Ashley Himmler

Best of the College of Arts & Humanities (Undergraduate): Alexzandria Quintero

Best of the College of Business & Industry (Undergraduate): Sara Adkinson

Best of the College of Health Professions & Wellness (Graduate): Rubyn Johnson

Best of the College of Science & Mathematics (Graduate): Kindall Brown

Best of the College of Science & Mathematics (Undergraduate): Hunter Ballard and Alyssa Jones

Best of the College of Social & Behavioral Sciences (Undergraduate): Madalyn Stott

Houston Cole Library Award for Research Excellence: Greta Romei

4 COVER DESIGN AWARD RECIPIENT

Students in the Department of Art participate in the cover design competition. An award is given to the student whose design is chosen by the Symposium Committee to be displayed on the program and proceedings.

Carlie Benefield, Program Cover Design Award Recipient, mentored by Chad Anderson & Christian Dunn.

Other Cover Design Participants: Brianna Bailey, Madison Cagle, Kristina Elliott, Lauren Martin, Laney Oneal, Carla Stewart, Asia Wright, and Marina Young.

5 ABSTRACTS

5.1 COLLEGE OF ARTS & HUMANITIES

5.1.1 “THE SIGN OF THE FOUR” BOOK DESIGN

Riley Abston
(Christian Dunn – Mentor)

Originally published in 1890, *The Sign of the Four* is the second of Arthur Conan Doyle’s Sherlock Holmes novels. The text explores the mind of Holmes as seen through the eyes of his colleague, John Watson. From cover to cover, to chapter heads, all the way down to page color, font choice, and text layout, conceptual decisions were made to create this newly redesigned edition of the story. The book uses several visual and physical elements to further express Holmes’ unique personality and Watson’s emotions throughout their adventure, as well as invite the reader to engage and interact with the mystery themselves. Different uses of typography push attitudes and emphasize ideas while words and sentences move across the page to match scenery and add rhythmic motion to the text. Loose pieces of evidence and clues are tucked away within the pages of the book for the reader to find, and handwritten notes are placed throughout the story so that the reader can follow Holmes’ detective processes and help solve the mystery of the Agra Treasure.

5.1.2 WOMEN IN TYPE

Brianna Bailey
(Christian Dunn – Mentor)

Most literature about type design and typefaces are mainly about the men who are widely recognized in this type of work. While the accomplishments of male type designers clearly need to be celebrated, as they have contributed much to typography and its history, it’s only reasonable that women’s roles be recognized as well. The influence of women in type design and typography is widely unseen in the modern world. The research completed in this paper serves to bring to light many forgotten women in this field and a general synopsis of some of their individual impacts. It also aims to discuss the influence and experience of women in the typographic field both in history and present day.

5.1.3 THE PSYCHOLOGY OF THE SCARECROW: LOOKING AT WHAT MAKES SCARECROW THE SCARECROW

Chase Capes
(Tanya Sasser – Mentor)

Since September of 1941, the D.C. universe and Gotham City have been haunted by the presence of Jonathon Crane A.K.A The Scarecrow. He toys with his victims and controls them using the one thing he loves: fear. He is determined to force everyone to face their greatest fear because he had to face his. There must be something deeper contributing to his evil ways. Over the years many people have questioned why Crane does what he does, but no one can seem to agree on one or even multiple things contributing to his motives. The research in this paper attempts to construct a psychological profile of Crane and a list of possible mental illnesses he may suffer from. This analysis will be backed up by the symptoms he exhibits across the various iterations of the character, from the comics, movies, and the Arkham video games. This paper will discuss Crane's mental health issues and his symptoms and looks at how Gotham might be different if Crane had never been abused as a child. It will also discuss how Crane could work directly with Batman if it weren't for his tragic past. The findings, though limited to one fictional character, could help more people understand why offenders in the real world commit their crimes. It can also serve as a learning tool for people wanting to know more about certain mental illnesses and the effects they could have on an individual.

5.1.4 TYPOGRAPHY, BASEBALL, AND THE FIGHT FOR CIVIL RIGHTS

Conner Gayda
(Chad Anderson – Mentor)

Typography is ubiquitous. As we navigate our daily routines, fonts compete for our attention. They seek to inform, excite, persuade, tell stories, and more. This demonstration specifically examines how fonts can be leveraged to tell stories — in this case, the story of Black baseball in Birmingham, Alabama. Inspired by the Birmingham Black Barons and their legendary pitcher Satchel Paige, my original font design “Satchel” is a typographic tribute to Negro League baseball and the fight for racial equality in Alabama. The end result is equal parts graphic design technicalities, civil rights history, activism, and sports fanaticism.

5.1.5 RESTORATION OF IDENTITY IN “ANGLIKAN SERAPHYM SUBJUGATION OF A WILD INDIAN RESERVATION”

Charles Harrell
(Teresa Reed – Mentor)

The poem "Abecedarian Requiring Further Examination of Anglikan Seraphym Subjugation of a Wild Indian Reservation" by Natalie Diaz illustrates the long-established history of tension and brutality between Native Americans and Europeans. The speaker forms a glaring criticism of imperialism and religious reeducation by portraying Christian imagery in accordance with the experiences of Native Americans. The poem also contains a deliberate balance of irony and earnestness with abecedarian form and heavy subject matter. These devices develop a declaratory tone, as it seems the speaker is boldly reclaiming their identity as a Native American, despite the external forces of white supremacy and the continual erasure of their culture. The poem is Diaz's personal affirmation of indigenous identity, relaying a broader message of resistance to oppressive expansionism, both cultural and religious.

5.1.6 KRISHNA, CHRIST, AND THE FULLNESS OF HUMAN LIFE

Ashley Himmler
(Raina Kostova – Mentor)

The Bhagavad Gita and the Gospel accounts of the New Testament tell a similar story of God's outreach to humanity through a human incarnation. Krishna, a central figure in the Gita, is an incarnation of the god Vishnu, who is concerned with the salvation of humanity. Similarly, Jesus Christ is the incarnation of the creator God of the Old Testament; this God is likewise concerned with the salvation of humanity. Written from a Catholic theological perspective, "Krishna, Christ, and the Fullness of Life" examines the similarities between these salvation accounts and their implications for cross-cultural studies of literature—specifically literature about divinity.

5.1.7 AUTUMN MERCHANT – AUGMENTED REALITY AS ILLUSTRATIVE MEDIUM

Brittani Myers
(Chad Anderson – Mentor)

Autumn Merchant is an explorative work in augmented reality as illustrative medium. Augmented Reality is the combination of digital content with the real world. Currently, the technology is used as a novelty within advertising, media, and entertainment. Up until recently, AR experiences required extensive development knowledge to produce. Due to Adobe's new application, Aero, AR is now being placed into the hands of creatives without this background.

5.1.8 PUSHING PERFECTION & PAIN: HOW THE 'MODEL MINORITY' MYTH HARMS ASIAN AMERICANS

Alexzandria Quintero
(Helen Kaibara – Mentor)

“Pushing Perfection and Pain” explores the birth of the titular ‘model minority’ myth while examining how it has since alienated Asian Americans in society both on the demographic and individual levels. This paper also briefly acknowledges the “benefit” of the ‘model minority’ myth that not only strengthens it, but also makes it difficult to identify. With historical analyses of the status of Asian Americans in the United States, first-hand accounts of experience with the ‘model minority’ myth, and explanations of the myth and its effect on today’s Asian Americans, it will be argued that the ‘model minority’ myth ascribed to Asian Americans has become increasingly detrimental towards their community in its development, as seen in the face of social stressors in the U.S. and the unique obstacle Asian Americans have to overcome in the generalization that results from this myth. In the wake of recent surges in Asian American hate crimes, the findings and arguments of this paper are significant because the ‘model minority’ myth is so ingrained into American society that not only is it overlooked, but so are its effects. This circumstance lends itself to have Asian Americans experience a form of discrimination so distinctive that they will be prevented from getting the necessary assistance until this concept is removed from its place in American culture.

5.1.9 MOONBERRY FARMS

Caycie Trotter
(Seth Johnson – Mentor)

Food waste in America has become a significant issue through the years. Almost 40% of all food in the United States is wasted each year, equating to 130 billion meals and more than \$408 billion. MoonBerry Farms’ goal is to combat that waste and educate people on a better way to manage the food they purchase or grow in a garden. People can learn the skill of canning fruits, vegetables, and more inside the canning cookbook. Moonberry farms also offers pre-canned foods with a longer shelf life than many competitors. Moonberry also encourages the recycling of all jars and packaging. Moonberry is intended to be people’s first step to better managing the food they purchase.

5.1.10 WIFE OF BATH: MULTIFACETED FEMINIST OR MANUFACTURED MISOGYNIST?

Drew Watson
(Teresa Reed – Mentor)

The Wife of Bath has proven to be a divisive character in scholarship surrounding The Canterbury Tales. Is she a proto-feminist who stands for medieval women's rights, or is she a misogynist whose words contradict themselves? Despite the perceived blatant differences between these two interpretations, both are supported by plentiful evidence in the Tales. "Wife of Bath: Multifaceted Feminist or Manufactured Misogynist?" is an art piece that depicts medieval feminist, medieval misogynist, and modern feminist Wives alongside each other to highlight how they each complement the original text – and how they coexist within it.

5.1.11 COMPARISON OF "OUT OUT--" AND "BALLAD OF BIRMINGHAM"

Sarah Yarbrough
(Teresa Reed – Mentor)

When children are forced to take on adult roles and responsibilities, it can often lead to tragedy. The two children discussed in this essay from Robert Frost's "Out Out" and Dudley Randall's "Ballad of Birmingham" demonstrate the consequences when children take on responsibilities that are beyond their capabilities. The influence of society also aids in stripping these children of their youth, innocence and identity.

5.2 COLLEGE OF BUSINESS & INDUSTRY

5.2.1 THE CBD INDUSTRY: A SILENT GROWING GIANT

Sara Adkinson
(Jianping Huang – Mentor)

Chinese Emperor Shen Neng discovered the first cannabidiol (CBD) benefits in 2737 BC. Originally, Emperor Shen Neng used CBD in a medicinal tea to help ease numerous ailments similar to the common uses seen today (Releaf Pharmaceuticals, n.d.). Uses of CBD range from pain and anxiety relief, inflammation reduction, and memory and sleep improvement (Harvard Health, 2021). However, despite these varying utilizations, many consumers are reluctant to use CBD due to its confusion with marijuana. While CBD can be derived from marijuana plants, all legal forms of CBD products that fall under the 2018 Agricultural Improvement Act are created from hemp plants. Under this act, more commonly called the Farm Bill, all CBD products in the United States must contain no more than 0.3% tetrahydrocannabinol (THC) (Vaden, 2018). This chemical compound allowed users to experience a heightened sense of the effects of CBD without the same “high” associated with marijuana consumption.

5.2.2 IMPACT OF THE COVID-19 PANDEMIC ON THE GOVERNMENT SALES TAX REVENUE

Sophia Ajemba
(Falynn Turley and William Hankins – Mentors)

The Covid-19 pandemic resulted in a dramatic change in the way people, businesses and government dealt with their day-to-day operations. The virus was spreading at an exponential rate, causing several restrictions to be placed on a state, federal and global level, such as limitation in face-to face interactions, a decrease in travelling, and eating out. Substantially, that affected the economy, such as businesses shutting down, unemployment rising, and economic growth declining. With that in mind, it is comprehensive to make an assumption that it also affected the government in terms of their revenue aspect, specifically sales taxes.

The questions that came to mind are: Did sales taxes decrease or increase during the peak pandemic year? Was their high impact on revenue in states that dealt with a lot more cases or less? Was there a correlation between the stringency index and the sales tax? In order to get answers for these interesting questions that arose, I decided to gather data from the Census website which consist of various data ranging from the state level sales tax to federal level sales tax. Furthermore, I also gathered data on the stringency index, in order to identify a correlation between the two variables.

5.2.3 BUSINESS INFORMATION: EXCEL DASHBOARD

Tyler Gallahar
(Falynn Turley – Mentor)

Suppose data expense entries for a construction firm need to be analyzed, interpreted, and presented. The data includes vendors, subcontractors, and overhead expenses for the firm and requires columns of categorical and quantitative information. The firm's owner must receive this data in a clean, dynamic spreadsheet with the option to select dates, vendors, and purchasing methods. The spreadsheet also needs to be simple for anyone to use and the results displayed on a dashboard screen. For ease of use, the owner desires buttons that will control the charts and amounts on the dashboard. The firm believes it could become more productive and profitable if it adjusted to modern technology and methods alongside its accounting software. Not having the necessary tools to build and maintain a product is the central problem. The program can be developed using functions and elements within Excel. After inputting all the data into Excel, the owner requests that the program be compatible with new data entries. The resolution is to use the data validation functions to choose categories from a dynamic drop-down list controlled on the spreadsheet. The data validation function will automatically update when new vendors subcontractors, or expenses are added. Supplying user-friendly lists guarantees that anyone can add or update information as needed. Next, to present the information on a dashboard, the table created for data entry will be the foundation for a pivot table. The pivot tables created will contain separate data which will be cycled and sorted with slicers. Pivot tables and slicers are what make the spreadsheet dynamic. If it were not for these two elements, the spreadsheet would not be influential, and the company would not have a need for new methods. Therefore, creating the necessary pivot tables and slicers will allow the user to choose what the dashboard displays. Summarily, I plan to demonstrate the creation, adjustment, and use of custom dynamic expense dashboards. I will walk through all functions and resources used to develop the program alongside all the applications it can endure. Although built for a construction firm, individuals can use this program for personal expense tracking by customizing the title and names of the document. Overall, the dynamic dashboard has been pivotal for my family's construction company and personal applications. For many years, my family has used various methods to track and report expenses, but recently this dashboard has increased productivity and profitability. Due to those results I wish to share with the audience what I have created.

5.2.4 KYAKU ZERO (K-0)

Jamall James
(David Thornton – Mentor)

Mathematics and robotics have been around for many centuries and will never die out. Both are part of S.T.E.A.M. (science technology engineering art and mathematics) which is fundamental for both of these topics. Math plays an integral part in robotics which incorporates the use of algebra, geometry, trigonometry, and calculus due to the fact that it applies in calculating, designing, measuring, and building a robot. Without Mathematics it would be a complicated task to build a robot. Robotics on the other hand is in a critical state without any aspects of math. For instance, if we want to design a robot that is the size of a car, tank, jet skyscraper, excavator, tunneling machine, satellite, and a planet mathematics is important when it comes to developing this advanced piece of science and technology. The robot that I have created Kyaku zero is an example of this demonstration which is an aspect of mathematics being applied into robotics.

5.2.5 THE EFFECT OF NAME, IMAGE, AND LIKENESS (NIL) POLICIES ON THE ROLE OF COLLEGE SPORTS AGENTS

Andrew Mitchell
(Julie Staples – Mentor)

Sports agents have played an integral role in the sports industry over the past several decades. A sports agent can be defined as a person who handles the business and legal deals for athletes, negotiates contracts, and assists athletes in financial management. Historically speaking, agents only represented professional athletes and were forbidden from representing college athletes due to strict amateur regulations imposed by the National College Athletic Association (NCAA). Coupled with policy changes relating to the definition of amateur athletics and a modification of the legal landscape, sports agents are now representing these amateur clients.

5.2.6 MITTAL FRUIT PRODUCTS

Anshika Mittal
(Jianping Huang – Mentor)

The research is about my family business which has been going on since 1955. We manufacture 100+ types of pickles and adapt them to the taste of people around India. With my degree in marketing, I want to expand my family business to different countries, starting in the US. The motto of the business is to provide customers, who live away from family or in a neutral family, with the taste of home. The history behind starting the business was that the old generations used to make pickles at their home in bulk, however, a lot of people have started living away from their families and would demand the familiar taste frequently. India is rich in culture and have a variety of spices which everyone deserves to taste. We have successfully fulfilled the demand of consumers and will continue to do it for more generations to come.

5.2.7 THE DECLINE OF RETENTION AT JACKSONVILLE STATE UNIVERSITY

Christopher Vest
(Mark Sciuchetti and Falynn Turley – Mentors)

Since 2015, the retention rate of first time, full-time students at Jacksonville State University has declined from 78% to 66% in 2021. The office of administration has data broken down by cohort showing social demographic factors and the retention of these students. These factors could be a reason that first time, full-time students are not returning for their second year. This cohort data will be analyzed to help find the reason for the decline in the retention rate. By using python and ArcGIS Pro the data can be broken down further by geographical area.

5.3 COLLEGE OF EDUCATION & PROFESSIONAL STUDIES

5.3.1 ANALYSIS OF STUDENT LEARNING THROUGH ELEGIAC WRITING

Hannah Cornett
(Cerilla Roe – Mentor)

This research project was initiated by JSU's Secondary Education department. Every semester, we complete an assignment in our classrooms that challenges us to analyze the learning development of our students on a larger scale. We are to create a learning segment that we teach to our students. This is the tricky part: we include a pre- and post-assessment of their learning to develop our data. Now, I know that data that assesses student learning looks much different than scientific data or statistics you see for political purposes, or other types of common data. In fact, the type of data we collect in the classroom is even different from the information we collect on a larger scale for education nationally. We know these students. We know their names, their friends and families, and academically, we know their strengths and weaknesses. As teachers, we build incredibly special relationships with these students, and we must handle them with care, so the purpose of this data is collected for the benefit of each and every student in that specific class. This data isn't determined so this child can become a statistic on a data chart on a national education website. We as teachers are responsible for assessing this data and further accommodating for the student or adapting our teaching styles to fit the needs of each student in the classroom. This feels like an impossible task most of the time, but this is the type of education these students deserve, and that is why I feel this research is worthy to be presented to those who value the importance of research and its many benefits, whether determined on a large or small scale.

5.3.2 PROTEIN & EXERCISE

Kennedy Gavin

(Majid Koozehchian, Kory Hill and Gina Mabrey – Mentors)

The approach that will be taken with this topic is how protein use can enhance performance in athletes and the benefits of using protein pre-workout and post-workout. As a collegiate athlete, this is a very familiar topic. As a collegiate athlete protein intake is something that has to be considered on a daily basis. The purpose of this abstract is to inform other athletes how protein can enhance their performance. It is important that other athletes or people who are active know when to consume protein. According to the research, fitness enthusiasts recommend consuming protein supplements 15-60 minutes after exercising. This is said to be the perfect timeframe for getting the most out of nutrients like protein. It is vital for people to know the reason for consuming protein after exercising, which is to repair or rebuild the muscles they have broken down from exercising. Protein is not used just for recovery. Consuming a high amount of protein can lower body fat, create lean muscles, and assist weight loss while still maintaining muscle mass. Consuming a high amount of protein can enhance your performance as an athlete. This is said to be true because protein creates amino acids, which is used to fuel the muscles that are being used during performance. Throughout this presentation people will be informed on different sources of protein, the benefits of consuming protein, the amount of protein to consume, and results on how it has enhanced performance for athletes.

5.3.3 NUTRIENT TIMING: AN EFFECTIVE APPROACH TO ENHANCED ATHLETIC PERFORMANCE, RECOVERY, AND TRAINING ADAPTATION

Gemini Sigler

(Majid Koozehchian, Kory Hill and Gina Mabrey – Mentors)

Nutrient timing is the delivery of high-quality nutrients via digestive consumption during exercise at various times. Macro- and micronutrients must be consumed at an optimal time pre, post, or during exercise in the appropriate amounts to increase performance, recover quicker, and train at a higher intensity. Nutrient timing can vary depending on desired outcomes and fitness activity. Understanding the benefit of macronutrients and micronutrients to aid in performance enhancement will aid in proper nutrient timing recommendations.

Restoring muscle glycogen stores for athletes performing intense workouts or competition is essential for optimal performance and recovery. Continued carbohydrate ingestion throughout exercise bouts has proven beneficial and improved performance. Exercise that is moderate to high intensity (65-80% VO₂ max) relies on glycogen stores, and proper nutrient timing has proven to promote recovery. Carbohydrate timing is essential, especially in athletes who exercise at high volumes. It is still important to deliver carbohydrates once a workout or competition commences, but these studies show that the ingestion of carbohydrates at regular intervals can optimize performance and maintain blood glucose levels. To maximize glycogen stores, athletes who exercise at high volumes should consume a high carbohydrate diet of at least 8-12 g/day.

With resistance training, there is a decrease in muscle glycogen concentration and some benefits to carbohydrate loading before and during the exercise or competition, but isokinetic muscle performance was not influenced.

Protein consumption with or without carbohydrates with proper nutrient timing at reasonable doses increases adaptations to exercise. Endurance athletes traditionally consume carbohydrates days and hours before competition to improve the pace of training. While, strength-power athletes consume protein post workout to improve muscle size, increase performance, restore glycogen depletion, and reduce muscle damage. For endurance athletes, when protein is combined with a carbohydrate ingested before exercise, performance improves and reduces muscle damage. Carbohydrate and protein ingestion is proven to influence force production and muscle damage markers. When the combination of carbohydrates + protein is consumed, muscle protein synthesis is increased, muscle damage is minimized, and recovery is accelerated after intense exercise. Protein doses improve muscle protein synthesis. The nutrient timing of 20 to 40 g of protein every 3 to 4 hours can improve performance and body composition.

The importance of pre and/or post-exercise nutritional timing is excellent. The benefits of an effective nutrient timing strategy can improve strength and reduce recovery time and muscle damage while improving body composition. Nutrient timing must be a priority for an athlete to prepare for optimal performance.

5.4 COLLEGE OF HEALTH PROFESSIONS & WELLNESS

5.4.1 B-ALANINE SUPPLEMENTATION AND ITS EFFECT ON SPORTS PERFORMANCE

Will Bernhardt

(Majid Koozehchian, Gina Mabrey – Mentors)

β -alanine is a commonly used supplement within the realm of athletics. Although it is produced in the human liver and found in poultry and meats, supplementation in higher amounts appears to affect athletic performance positively. Immediate effects on performance are believed to be increased resistance to fatigue and, potentially, increased force production. Carnosine is a dipeptide molecule composed of L-histidine and β -alanine. β -alanine acts as the rate limiter for carnosine production. Intramuscular carnosine is a diffusible $\text{Ca}^{2+}/\text{H}^{+}$ exchanger at the sarcomere, auguring skeletal muscle force production. Carnosine is more readily available with an increased presence of β -alanine via supplementation. During high-intensity exercise, intramuscular H^{+} ions accumulate, and carnosine binds. Thus, carnosine acts as a pH buffer, attenuating muscular fatigue. Additionally, the increased binding of carnosine and H^{+} induces Ca^{2+} unloading at the sarcomere, increasing cross-bridge formation and, thus, force production.

In order to understand the function of β -alanine concerning muscle fatigue and performance, β -alanine has been evaluated in various sports conditions. During anaerobic activity, it is found that β -alanine is effective at reducing muscular fatigue by attenuating the onset of muscular acidosis. Bouts of exercise ranging from 60-240s saw significant improvements in anaerobic endurance. Acidosis is not a limiting factor in activity lasting less than the 60s, so it is not relevant to β -alanine supplementation. Additionally, β -alanine supplementation significantly improves aerobic endurance in activity over 4 minutes. This athletic performance improvement was not limited to open-end tasks or the continuation of an exercise until failure. In closed-end tasks, participants of the testing group in certain studies saw a decrease in time to completion, while the placebo group saw no improvement.

The findings for beta alanine's influence on strength output are much more mixed than those for endurance. Most studies find insignificant changes in 1RM maximal effort strength across multiple movements, such as the barbell back squat or bench press. However, β -alanine supplementation improved resistance to fatigue and achievable total exercise volume. β -alanine supplementation is also associated with minor improvements in resistance to neuromuscular fatigue, consistent with previous contradictory results. However, more prolonged supplementation and an older population benefit more than younger people or supplements for shorter durations.

In all areas, supplementing β -alanine appears to aid in athletic performance in those that consume β -alanine daily for a minimum of 4 weeks. Supplementing for longer improves the athletics performance effects. Overall, β -alanine is a safe and effective supplement for most populations at appropriate doses regarding athletic performance. The only known side

effect is paraesthesia (tingling feeling), but studies find that this can be mitigated by lowering the dosage.

5.4.2 ORAL CREATINE SUPPLEMENTATION AND ATHLETIC PERFORMANCE

Ariya DeVine

(Majid Koozehchian, Gina Mabrey – Mentors)

Creatine is an organic compound produced in the body from the amino acids glycine, arginine, and methionine. It is one of the most popular nutritional supplements for athletes due to its consistent output of results. Studies show that creatine supplementation increases the body's intramuscular creatine concentrations, leading to noticeable improvements in high-intensity exercises and strength. Research has also shown that in addition to athletic improvement, creatine supplementation may enhance post-exercise recovery, prevention of injuries, rehabilitation, as well as protection of nerves in the spinal cord. Additionally, several clinical applications of creatine supplementation have been studied involving neurodegenerative diseases (such as muscular dystrophy, Parkinson's, and Huntington's disease), as well as diseases such as diabetes, osteoarthritis, fibromyalgia, aging, brain and heart ischemia, adolescent depression, and pregnancy. All of these studies provide such a large pool of evidence that creatine supplementation can not only improve exercise performance but can also play a role in preventing and/or reducing the severity of the injury, enhancing rehabilitation from injuries, and helping athletes tolerate heavy training loads. In the clinical application of this study, researchers found that using creatine supplements, whether short-term or long-term, is safe in infant to elderly populations.

5.4.3 BLOOD FLOW RESTRICTION IMPROVES THE REHABILITATION PROCESS IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION AMONG COLLEGIATE ATHLETES: A CRITICALLY APPRAISED TOPIC

Justin Files

(Jennifer Savage and Christopher Clark – Mentors)

Context: Muscle weakness and muscle atrophy are commonly experienced after a musculoskeletal injury occurs. For example, after an athlete has anterior cruciate ligament (ACL) reconstruction surgery, there is typically muscle atrophy of the quadriceps muscle group. Athletic trainers are constantly researching methods to improve rehabilitation techniques. Blood flow restriction (BFR) is an emerging therapeutic modality that utilizes a pneumatic to limit the amount of blood flow to an extremity. The purpose of this critically appraised topic is to evaluate the effectiveness of blood flow restriction training post-surgically for the ACL in the population of collegiate athletes.

Methods: A computerized search was completed in October 2022. The search terms used were “blood flow restriction”, “ACL reconstruction”, “ACL rehabilitation protocol”, and “perioperative ACL rehabilitation”. Electronic databases used were Jacksonville State University Library, PubMed, and Sports Discus. Inclusion criteria: Studies involving BFR training, studies that were in the English language, and studies evaluating ACL rehabilitation. Exclusion criteria: Studies that included additional injuries other than ACL rupture with meniscus and studies focused on the geriatric population. Validity of the selected studies was determined using the Physiotherapy Evidence Database (PEDro) scale and the Strengthening in the Reporting of Observations Studies in Epidemiology (STROBE). One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on study quality

Results: The literature search retrieved seven total articles and three were excluded based upon exclusion criteria, resulting in four studies. Research has shown that a longer duration of moderate pressure BFR training (15 weeks) combined with low resistance muscular training may increase the quadriceps cross-sectional area to a greater extent than low resistance training alone. Additionally, the sets and repetitions should be 1 set of 30, followed by 3 sets of 15. Studies showed that BFR was a quality modality to be used during ACL reconstruction rehabilitation when compared to not using BFR.

Conclusion: BFR is a reliable modality when used in post-surgical cases for ACL reconstruction, with results showing improvement in hypertrophy of the quadriceps and hamstring groups. Future research should include the effects of BFR post-surgically on an upper body injury such as a labral tear or rotator cuff tear. In addition, future studies can also be conducted on the long term cardiological effects of BFR, along with how long term BFR use affects muscular function.

5.4.4 CAN HELMETS ASSIST IN THE REDUCTION OF CONCUSSIONS IN FOOTBALL ATHLETES, WHEN COMPARED TO PATIENT EDUCATION AND TACKLING TECHNIQUES: A CRITICALLY APPRAISED TOPIC

Micah Glover

(Jennifer Savage and Christopher Clark – Mentors)

Context: The primary job of a helmet is to cushion the blow that players receive during games by using a hard exterior and a cushioned interior to provide optimal protection during contact. Patients primarily need to be introduced to tackling techniques that reduce the force placed on the head during tackles, as this involves using your shoulders to utilize appropriate tackling techniques. If a football athlete leads with the head during a tackling technique, it can increase the likelihood of head injuries. The purpose of the critically appraised topic is to examine the effectiveness of helmets in reducing the risk of concussions in football athletes compared to proper tackling techniques and patient education.

Methods: A computerized search was completed in October 2022. The search terms used were “concussions”, “football”, “prevention”, “tackling techniques”, and “helmets”. Electronic databases used were Pubmed and the Jacksonville State University Library. Inclusion criteria: Articles written in the English language, limiting concussion risks, and published articles within the past ten years. Exclusion criteria: Soccer, rugby, and studies that were focused on rehabilitation of concussions. Validity of the selected studies was determined using the Physiotherapy Evidence Database scale and the Strengthening the Reporting of Observational Studies in Epidemiology. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come on study quality.

Results: The literature retrieved 16 total articles and 12 were excluded based on exclusion criteria, resulting in four studies. The study confirms that patient education, proper tackling techniques, and certain characteristics of helmets are beneficial approaches to reduce the risk of concussions. Current methods of teaching proper tackling techniques and initiation of targeting rules decreased concussion rates by up to 40%. In addition, improperly fitted helmets amount for up to 7% of all concussions. Furthermore, different brands of helmets can decrease concussion rates based off the design and inner lining. Lastly, patient education is important because coaches teach at-risk tackling techniques and are unaware of the sustained injuries involved in football. Teaching athletes to avoid leading with the helmet which exposes the head is vital to reduce the risk of concussions.

Conclusion: The study strengthens the needs of patient education, proper tackling techniques, and characteristics of helmets can be beneficial in reducing the risk of concussions. Future studies should compare the most common types of helmets, along with the injury rates when using certain lining within the same helmets. In addition, the severity of concussions when using improper tackling needs to be conducted.

5.4.5 ANKLE INJURIES & ATHLETIC TRAINING COVERAGE IN MARCHING BAND: A CRITICALLY APPRAISED TOPIC

Chandler Ingram
(Christopher Clark and Jennifer Savage – Mentors)

Context: In the activity of marching band, members perform various techniques that could put them at a higher risk of lower extremity injuries. The techniques that are taught places the talocrural joint in a position that increases the risk of ankle sprains and could progress into chronic conditions if left untreated. Athletic training medical coverage is limited for marching band activities and expanded access to these healthcare providers could be beneficial to all members participating. The purpose of this critically appraised topic is to demonstrate that lower extremity injuries are present in marching band and that athletic training techniques can be used to holistically manage these injuries.

Methods: A computerized search was conducted in October 2022. The search terms used were “marching band”, “marching band members”, “marching athletes”, “marching band injuries”, “musicians”, and “ankle sprain”. Electronic databases used were Jacksonville State University’s Library, SPORTDiscus, PubMed, Google Scholar, and Google searches. Inclusion criteria: Research regarding lower extremity injuries in the marching band setting and articles published in the English language. Exclusion criteria: Research article pertaining to musicians that are not in the marching band setting (pianist, organist, etc.). Validity of the selected studies was determined using The Physiotherapy Evidence Database scale and Strengthening the Reporting of Observational Studies in Epidemiology scale. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on the study quality.

Results: The literature search retrieved 3,482 total articles and 3,479 were excluded based on the exclusion criteria, resulting in 2 studies and 1 informational text. Research shows that during the band camp period, various types of injuries and conditions are present in these activities. These injuries and conditions include lower extremity musculoskeletal injuries, dermatological issues, gastrointestinal distress, heat distress, trauma such as blisters, upper extremity musculoskeletal injuries, and other illnesses. Furthermore, lower extremity injuries consisted of 35% of all injuries during the band camp period. Therefore, a healthcare professional that specializes in treating musculoskeletal injuries at all levels could be beneficial to the activity.

Conclusion: Research demonstrates that ankle injuries are present in the marching band activity and athletic training medical coverage could be beneficial in managing and preventing injuries. Further research is warranted for the marching band population and the need for athletic trainers to manage the holistic care of injuries.

5.4.6 ATTENTION DEFICIT HYPERACTIVITY DISORDER MANAGEMENT IN COLLEGIATE ATHLETES: A CRITICALLY APPRAISED TOPIC

Tamicha Ingram

(Jennifer Savage and Christopher Clark – Mentors)

Context: Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that is defined by impairing behavior patterns that result in abnormal levels of inattention, hyperactivity, and/or impulsivity. ADHD can be diagnosed by a licensed psychiatrist or other healthcare professionals. This disorder is common among all populations; however, this research is primarily focused on collegiate athletes. The purpose of this critically appraised topic is to compare the effectiveness of physical exercise and prescription medication for the management of ADHD symptoms in collegiate athletes.

Methods: A computerized search was conducted in October 2022. The search terms were “ADHD or attention deficit hyperactivity disorder,” “ADHD in collegiate athletes,” “behavioral intervention,” “aerobic exercise,” “medication,” and “NCAA.” Electronic databases used were Jacksonville State University Library, SPORTDiscus, ScienceDirect, MEDLINE, and ProQuest. Inclusion criteria: Literature that was published in the English Language, contained ADHD, physical activity and/or medication, and collegiate athletes. Exclusion criteria: Studies regarding autism, anxiety, and concussions were excluded. Validity of the selected studies were determined using the Physiotherapy Evidence Database (PEDro) Scale, Scale for the Assessment of Narrative Review Articles (SANRA), and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on study quality.

Results: The literature search retrieved nine total articles, but four were excluded based on exclusion criteria, resulting in five articles. ADHD symptoms are typically regulated using prescribed medication such as Adderall, Vyvanse, and Strattera. Aerobic exercise such as swimming, running, and high intensity interval training can reduce short-term and long-term symptoms of ADHD. It is safe for collegiate athletes to use medication and/or aerobic exercise to regulate ADHD symptoms.

Conclusion: Attention Deficit Hyperactivity Disorder is a neurodevelopmental disorder that effects individuals differently. Additional research is needed to understand how ADHD affects collegiate athletes and how to manage the disorder while participating in sports. Both physical exercise and prescription medication can be utilized to manage symptoms of ADHD.

5.4.7 IMPACT OF PROBIOTICS ON EXERCISE PERFORMANCE

Cole Ivey

(Majid Koozehchian and Gina Mabrey – Mentors)

Scientists believe that probiotics are live microorganisms that grant health benefits to the host when administered in adequate amounts. The administration of probiotics has been majorly linked with benefits in the gut and immune system, among other health benefits. However, the health benefits of probiotics are both strain and dose-dependent on probiotic function. Compared to sedentary people, an athlete's gut microbiota composition has been linked to the level of activity, the volume of exercise, and the volume of protein consumption. Specific probiotic strains can increase the absorption of key nutrients in athletes, affecting the properties of crucial food components. Probiotic supplementation has been shown to promote healthy responses to immune depression in athletes. This immune depression can occur with excessive training load, psychological stress, lack of sleep, and environmental extremes. Athletes training in prolonged exercise in the heat has been shown to increase gut permeability, potentially resulting in systemic toxemia, which is when the body's defense mechanisms activate to fight off toxins or bacteria that can cause injury to tissue in the body. Specific probiotic strains can help to improve the integrity of this gut barrier and help reduce the risk of systemic toxemia. Improved recovery from muscle-damaging exercise has been linked to administering specific anti-inflammatory probiotic strains. Products that contain probiotics must include the minimal effective dose and method of administration as well as the genus, species, and strain of every live microorganism on the product's label. Lastly, probiotics benefit athletes through improved body composition, lean body mass, average age-related declines in testosterone levels, reduced cortisol levels, reduced levels of exercise-induced lactate, and increased neurotransmitter synthesis, cognition, and mood levels. Probiotics, if administered appropriately, can significantly benefit athletes and help optimize overall health, performance, and recovery.

5.4.8 FLUID PERIODIZATION: A NEW APPROACH TO SPORTS PERFORMANCE

Rubyn Johnson

(Majid Koozehchian, Gina Mabrey – Mentors)

As the amount of technology surrounding the sports performance landscape has increased, there has been a shift in how coaches approach year-to-year, month-to-month, and day-to-day performance planning. Periodization is the division of training into specific phases wherein coaches and athletes manipulate training variables such as sets, reps, load, and bio motor abilities to bring about specific adaptations to maximize athletic performance at the proper time. Over the years, many periodization models have been researched and implemented to elicit positive improvement in athletic performance, but none of those models take into account the physiological assessment of the individual with objective measures. Since individuals have large variability in genetics and external environmental factors, it is reasonable to believe that individuals recover differently than others even when exposed to the same stressors. Athlete monitoring systems offer an objective assessment purported to evaluate an individual's physiological readiness to adapt to an overload stimulus, thus allowing daily manipulations in training loads. The term fluid periodization describes physical training, which adjusts volume and intensity based on the physiological assessment of the individual with objective measures. This research review aims to evaluate the differences in periodization models and the effects of fluid periodization on athletic performance.

5.4.9 EXERCISE AND FLUID REPLACEMENT

Edzer Mauger

(Majid Koozehchian – Mentor)

When it comes to balancing a hydration body level while conducting physical activity, exercise and fluid replacement provide recognition of principle. This presentation will go into detail on rehydrating before beginning workout. To allow for fluid absorption and urine flow, prehydrating with refreshments, in addition to regular meals and fluid consumption. What matters is that output levels return to normal. The goal of drinking while exercise is to avoid dehydration (92% body weight loss from water deficiency) and significant changes in electrolyte balance, which can lead to poor performance . Individualized fluid replacement regimens are advised because sweating rates and electrolyte levels vary greatly between people. Individual sweat rates can be calculated by weighing oneself before and after activity. In some cases, consuming electrolytes and

carbohydrate-containing substances during exercise can provide advantages over drinking water alone. The goal after exercise is to replace any fluid electrolyte. The reason Fluid Replacement is important to discuss is because an individual may have a health concern that causes dehydration or even overdrinking due to a lack of water and electrolyte intake. Dehydration is more prevalent than it should be, but it is important to avoid it so that an individual does not suffer from significant heat disease. Dehydration increases the risk factor for heat stroke. Dehydration increases the physiologic strain and perceived effort required to complete the same workout goal. Physical exercise can cause people to get dehydrated. Larger fluid deficits may have been more typical previous to the emphasis on rehydration during exercise. Individuals frequently begin an exercise task with normal total body water and dehydrate over time; however, in some sports, the person may begin the exercise task dehydrated, for example, when the interval between exercise sessions is insufficient for full rehydration or when initial body weight is an issue. When it comes to sex, women often sweat less and lose less electrolytes than males. They sweat less because they have a smaller body size and lower metabolic rates when doing a given exercise task. Furthermore, when their skin is wet, women appear to have less wasted perspiration. That is when meal consumption is crucial to maintaining full hydration on a daily basis. Euhydration is promoted by meal eating. Eating enhances fluid intake and retention. Sweat electrolyte deficits must be restored in order to regain total body water, which most people can do during meals. The macronutrient composition of the diet has a limited affect on urine losses during rest and is likely to have an even less influence during activity. As a result, the macronutrient composition of a person's diet has no discernible effect on their daily hydration requirements. Now The purpose of prehydrating is to start the physical activity euhydrated and with normal plasma electrolyte levels when it comes to fluid replacement. If enough fluid are taken with meals and a long recuperation period (8-12 hours) has passed since the last activity session, the person should be close to becoming euhydrated. When During Exercise, the purpose of drinking during exercise is to avoid extreme dehydration (92% BW loss through water deficit) and significant changes in electrolyte balance, which can lead to poor exercise performance. The volume and rate of fluid replenishment are determined by the individual's sweating rate, exercise duration, and drinking opportunities. Individuals should drink (as opportunities allow) throughout activity on a regular basis. The goal following an Exercise session is to thoroughly replace any fluid and electrolyte deficiency. The degree of aggression required is determined by the rate at which rehydration must be completed and the extent of the fluid-electrolyte deficit. If recovery time and chances allow, normal meals and snacks with an adequate amounts of plain water will restore euhydration, as long as the food contains enough salt to replace sweat losses.

5.4.10 THE EFFECTIVENESS OF CAFFEINE IN EXERCISE PERFORMANCE

Greta Romei

(Majid Koozehchian, Gina Mabrey – Mentors)

Caffeine is one of the most widely consumed psychoactive substances in the nation and the entire world. Caffeine is contained naturally in dozens of different plants, including coffee, tea, and cocoa. The substance is mainly consumed in the form of coffee. However, there has been a recent increase in its usage in energy drinks. In young adults and exercising individuals, there has been a rise in caffeine consumption in caffeine-containing products in the form of pre-workout supplements, chews, aerosols, and other caffeinated food products. Due to their high consumption, caffeine-containing products and caffeine have been a long-standing topic of interest. Most importantly, the rise in caffeine consumption in the sporting world increased the interest of researchers who began studying these products' effectiveness on exercise performance. According to research, the mechanism of action or MOA that caffeine has on the central nervous system (CNS) seems to be why the substance alters performance.

The substance is believed to exert its effect on the CNS via the antagonism of adenosine receptors, leading to an increase in neurotransmitter release, motor unit firing rates, and pain suppression. Due to its molecular similarity to adenosine, caffeine binds to adenosine receptors after ingestion increasing the concentration of these neurotransmitters. This ultimately results in positive effects on mood, vigilance, focus, and alertness. Caffeine supplementation enhances muscular endurance, movement velocity, muscular strength, sprinting, jumping, throwing performance, and anaerobic sport-specific actions when utilized for exercise performance. Most results of utilizing caffeine are witnessed in aerobic endurance performances, above all when utilized in doses of 3-6 mg/kg body mass. Different studies have been made on the effectiveness of lower doses of caffeine (2mg/kg) and high doses (9 mg/kg). The effect of minimal doses of caffeine remains unclear, while high doses are associated with a high incidence of side effects and do not seem to be required to provoke an ergogenic effect. Active individuals tend to utilize caffeine supplementation 60 minutes prior to exercise, but research has shown that the optimal time of ingestion highly depends on the source itself. The substance improves performance and cognitive function, including attention and vigilance, even in individuals under conditions of sleep deprivation. Side effects of caffeine include sleep deprivation or restlessness, agitation, and, in some cases, anxiety but the substance is considered safe when utilized in the recommended amount.

Physically active individuals that utilize pre-workout or caffeine supplements seem to have better anaerobic and aerobic performance. Due to caffeine's tendency to affect CNS function, anti-doping authorities have investigated the drug throughout the years. Both the IOC, and the World Anti-Doping Agency (WADA) banned the substance in 1984 and 2000. A doping offense was defined as having a urinary caffeine concentration exceeding a cut-off of 15 ug/mL. The two associations removed the classification in 2004, which caused a rise in caffeine intake among the athletic population. Interestingly, caffeine is categorized as a banned substance by the National Collegiate Athletic Association (NCAA) if urinary caffeine concentration exceeds 15 ug/ml. Although further research needs to be done to determine

the specific amount of caffeine that the active population could safely ingest without it being considered doping, the substance has been shown to improve performance and cognitive function among active and non-active populations.

5.4.11 SUBTHRESHOLD AEROBIC EXERCISE AS A STRATEGY FOR CONCUSSION MANAGEMENT: A CRITICALLY APPRAISED TOPIC

Greta Romei

(Jennifer L. Savage, Christopher M. Clark – Mentors)

Context: Healthcare providers not only have to be able to recognize when a concussion appears, but they also must recognize how to manage and treat the injury properly in order to prevent further damage to the brain and ensure a safe return to play for the athlete. Previously, the most commonly utilized management strategy to resolve a concussion was rest, but currently, research demonstrates how controlled aerobic exercise can provide a faster recovery, while respecting safety protocols. The purpose of the critically appraised topic is to compare the effectiveness of subthreshold aerobic activity utilizing the Buffalo Concussion Treadmill Protocol (BCTT) vs. rest, in athletes with a sport-related concussion (SRC)

Methods: A computerized search was completed in October 2022. The search terms used were “Buffalo Concussion Treadmill Test”, “rest”, and “subthreshold activity in concussion management”. Electronic databases used were Jacksonville State University Library, PubMed, SportsDiscus, and Google Scholar. Inclusion criteria: Individuals with SRCs and published articles within the last five years, that were in the English language. Exclusion criteria: Articles that utilized other threshold protocols or exercises. Validity of the selected studies was determined using the Physiotherapy Evidence Database scale and the Mixed Methods Appraisal Tool. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on study quality.

Results: The literature search retrieved seven total articles and three were excluded based on exclusion criteria, resulting in four studies. Subthreshold aerobic activity is found to be reliable and effective in diagnosing and managing SRCs. When compared to rest, the BCTT promotes healing and speeds up the recovery process without further damaging the brain or worsening symptoms. The BCTT is safe to use with athletes and is found reliable with a multitude of sports.

Conclusion: The BCTT is a valid and realizable test that can be utilized in managing SRCs. Further research is needed to determine how to correctly use the protocol in the earlier stages of SRC management.

5.5 COLLEGE OF SCIENCE & MATHEMATICS

5.5.1 INVESTIGATION OF TCOF1 VARIATIONS: AN INSIGHT TO TREACHER COLLINS SYNDROME

Hunter Ballard and Alyssa Jones
(Jenna Ridlen – Mentor)

Treacher Collins Syndrome (TCS) is a genetic disease in which the development of facial bones and tissues is affected. It is very rare, affecting approximately one in every 50,000 people. TCS is caused by a mutation in one of three genes: TCOF1, POLR1C, or POLR1D. Although it can occur in all three of these, the TCOF1 gene accounts for 81 to 93 percent of cases. Why a mutation in these genes causes TCS revolves around the fact that these proteins aid in the production of ribosomal RNA (rRNA), which helps assemble amino acids into new proteins. A mutation causes the amount of rRNA produced to decrease, which then triggers some facial-building cells to destroy themselves (apoptosis). Symptoms of TCS are primarily physical, so it typically has no effect on mental stability or intelligence. Unfortunately, there is no cure for Treacher Collins. However, some of the symptoms can be treated by means of genetic counseling classes, physical aids such as hearing aids, or various surgeries that may be able to lessen the effects of this disease. In this project, two different mutations of the TCOF1 gene are studied to determine the pathogenicity of each. Both missense mutations, F39L and E621V, are of uncertain significance. The pathogenicity, structure, and the conservation of variants across species are under investigation via multiple public databases and molecular prediction software including Simple Clinvar, PolyPhen 2, AlphaFold, Uniprot, and YASARA. Through these tools, a conclusion will be formed about the likely pathogenicity of each variant, and any patterns discovered will be noted and shared with the greater scientific community.

5.5.2 GAMIFICATION MARKETPLACE

Victoria Barkley
(David Thornton – Mentor)

In the class Software Engineering II, my team and I were tasked with the project of creating the design implementation of a Marketplace application. The purpose of the Marketplace application is to give instructors the ability to create purchasable items in a store that can be used with real in-course effects that students can buy and activate. With this project, we focused more directly on the different developmental stages of the app. We took on more of a managerial role or a product owner role rather than the roles of the programmer or software designer. In these roles, we focused on determining what needed to be included in the application and what the client (Dr. Thornton) wanted the application to accomplish, what features the client wanted, and any other information, ideas, and aspects the client wanted the development team to achieve with their application. This application would be built into a Learning Management System (LMS) such as Canvas or Blackboard and can be used throughout any course within a school. With this application, a teacher can create items that they can sell to the students through the Marketplace using a fake online currency that the teacher awards to the students. The application is connected to the Learning Management System of the school, so the teacher would be able to access the Marketplace from their LMS. In the Marketplace application, they will be able to view any items they created, view items that belong to certain classes, and see the balances of the students in their classes. For the development of this application, we spoke with the client (Dr. Thornton) and interviewed him about what he wanted for the application. Once we had the design aspects of the application, we began to work through the functional and nonfunctional requirements that would be needed. These were combined to make the software system requirements. We then created a use-case diagram to map out the most important features of the application. Next, we created the sequence diagrams which were based on the different features of the use-case diagram. The sequence diagrams were meant to go more in-depth with the features. Then, we completed the class diagram which would give the software developers the starting points and methods that they would need for the project. We created the database schema which is essentially the structure for the database. Finally, we created the data dictionary and the interface mockups. The data dictionary is meant to give the client, the team members, and the product developers that defined attributes from the database schema. The interface mockups were meant to present the application's basic functionalities and display the visual details that the client wants with their product.

5.5.3 TOXIC AIR POLLUTION IN LOUISIANA

Cassidy Bolt

(Mark Sciuchetti – Mentor)

Louisiana has been suffering from toxic air pollution in industrialized cities for decades. The areas in Louisiana affected heavily by industrial pollution range from north to south Louisiana. According to the Environmental Protection Agency, some regions in “Cancer Alley” show higher risks of various types of cancer. The chemicals released in the air and ground can lead to colon, lung, and bladder cancer. The air quality is expected to decrease with the chemical industry growing rapidly in this area. The national spread of toxic chemicals in the air has been declining since the 80s, but results in Louisiana are not as significant as in other high-polluting states. Increased air toxicity levels with cancer-causing chemicals predominantly affect marginalized communities within the state. Louisiana is the seventh in the nation with the highest cancer rates, while some large industrial companies still refuse to admit the direct link between pollution and cancer. While smoking and obesity are significant cancer contributors, they do not entirely explain the geographical patterns of high health risks throughout this state. Using maps that show race, poverty, and pollution levels can accurately represent the effect air pollution has on the state. The Louisiana Department of Environmental Quality has been informed and advised by scientists to reevaluate their measurements on air pollution exposure. Yet, they insist that industrial pollution is not a significant cause of cancer in Louisiana. These parishes will continue to endure the burden of toxic air pollution without environmental justice.

5.5.4 THE RELATIONSHIP BETWEEN CHANGING LAND COVER AND MACROINVERTEBRATE DIVERSITY OVER TWENTY YEARS IN CHOCCOLOCCO CREEK, NORTHEAST ALABAMA

Kindall Brown
(Lori Tolley-Jordan – Mentor)

Alabama rivers, creeks, and springs are considered a global hotspot of biodiversity. In this region, one stream that is an important diversity hotspot is Choccolocco Creek, one of the largest tributaries in the Coosa River drainage system. The headwaters of the creek begin in the Talladega National Forest in Cleburne County, and flows through Calhoun, Clay, and Talladega counties to the confluence with the Coosa River. One way that diversity can be measured is through identifying Aquatic macroinvertebrates (aquatic insects, mollusks, worms, and crustaceans) as these species are considered ‘canaries in the coal mine’ for detection of pollution and habitat degradation in freshwaters and are used as tools to determine stream health by the US EPA and state monitoring agencies. Choccolocco Creek is surrounded by a variety of land use that affects water quality and habitat. These include agriculture, urban, and industrial uses. Based on comparisons 2000 and 2011 survey of the creek, declines in macroinvertebrate diversity were detected and an ongoing survey (summer 2022 to spring 2023) as part of my master’s thesis will determine if declines are ongoing. In addition, changes in invertebrate diversity will be correlated to changing land use over the 23-year period using data made available by the National Land Use Land Cover land sat imagery. These long-term assessments of watersheds are critical for determining biodiversity changes due to stream degradation and results from this study will hopefully promote more interest in biodiversity in Alabama streams.

5.5.5 GENE VARIANT KLHDC8B AND ITS PHENOTYPIC EXPRESSION IN CLASSIC HODGKIN’S LYMPHOMA

BriAnn Buford
(Jenna Ridlen – Mentor)

Hodgkin’s Lymphoma was a variation of the known cancerous Lymphoma. It was classified by the swelling of the lymph nodes in the neck, groin, or armpits; which could be present as painless swelling or swelling that was painful to the patient. Other traditional symptoms such as fatigue, fever, chills, and weight loss were also associated with the diagnosis. There were 50 gene variants associated with generalized lymphoma, however, gene variant KLHDC8B was specifically associated with the Hodgkin’s manifestation of Lymphoma. The aforementioned gene variant was studied in order to determine the predicted expression of Hodgkin’s Lymphoma. Various online databases such as NCI’s ClinVar and YASARA Bioscience software were used to visualize the manipulation and specification of the gene in terms of its phenotypic expression and alternations of expression based upon said manipulation.

5.5.6 FASTEST VELOCITY: JSU FASTBALLS

Hannah Davis
(Jason Cleveland – Mentor)

When examining a baseball pitcher's performance, one variable that is reviewed is fastball velocity. This study sought to determine if certain pitchers on the JSU baseball team have a significantly higher fastball average than JSU's estimated average, as given by the JSU pitching coach. Pitching data was collected using Flightscope at 18 JSU home baseball games. Every pitch was tracked, categorized by the author, and saved into multiple Excel files. The 1431 observations were compiled into a single Excel file to be used in R. An ANOVA model was used to predict the mean and variance of each pitcher's fastball. Results for the mean suggested that pitchers two, three, and seven had significantly slower fastballs than the team average, while pitcher nine had a significantly faster fastball than the team average. Results for the variance suggested that pitchers one, three, six, ten and twelve had more variance, which could be useful when planning game strategy.

5.5.7 AN EVOLUTIONARY COMPARATIVE STUDY OF CONGENITAL STATIONARY NIGHT BLINDNESS ASSOCIATED TRPM1 GENETIC VARIANTS OF UNCERTAIN SIGNIFICANCE IN HUMANS AND HORSES UTILIZING CAENORHABDITIS ELEGANS

Gabrielle Davis and Sara Morris
(Ashley Turner – Mentor)

Congenital stationary night blindness (CSNB) is a heterogeneous collection of genetic diseases affecting the eyes and vision in humans and horses. Current research has implicated several genetic mutations impacting different genes involved in phototransduction and signal transmission. This includes autosomal recessive mutations in the TRPM1 gene, which encodes for an ion channel expressed on the dendrites of bipolar cells involved in signal transmission from rods. In horses, genetic mutations in TRPM1 also result in a leopard-spotted coat pattern. Studies of *Caenorhabditis elegans* have revealed an orthologous TRPM1 gene known as gon-2 that regulates a transient receptor potential channel required for the initiation and continuation of postembryonic cell divisions of gonad cells. If a TRPM1 missense variant has been associated with CSNB in humans and horses and/or spotted coat patterns in horses, then the genetic variant could result in gon-2 dysfunction and a phenotype in the mutant nematode. Identification of conserved variants of uncertain significance (VUS) within the TRPM1 were identified in both humans and horses. The human and horse TRPM1 genes, along with the nematode gon-2 gene were utilized to examine conservation of 31 missense VUS through multiple sequence alignments and 3 were identified to be conserved across all 3 species. These conserved VUS were at the following human TRPM1 locations: E1324K, H1195R, and I875V. Conducting a gene mutational analysis revealed the VUS at H1195R and I875V were most likely to be pathogenic due to their positioning next to pathogenic or likely pathogenic variants

reported through ClinVar. Through Poly-Phen 2 analysis, I875V was predicted to be likely pathogenic (HumDiv score 0.775). Protein models were generated and analyzed, and it was observed that I875V impacts the mutant protein structure compared to wildtype protein. Therefore, the VUS I875V was selected for further investigation. Future experiments include generating a CRISPR-Cas9-engineered *C. elegans* model containing the TRPM1 missense VUS in the nematode loci of *gon-2* for in vivo assessment. Primers were designed and optimized to amplify the I875V VUS region in *C. elegans* using polymerase chain reaction (PCR), gradient PCR, and gel electrophoresis. CRISPR RNA guides and a DNA repair template have been designed and will be used for microinjection of nematodes along with Cas9 protein to generate the potential mutant strain. The optimized PCR-based assay will be used for mutant nematode screening. Ultimately, we plan to analyze phenotypic differences present in the mutant nematode strain when the *gon-2* gene is edited with the TRPM1 VUS. If the VUS does impact function of *gon-2*, then it is expected to impact gonadal and vulva development. This study will provide in vivo assessment of this CSNB-associated VUS shedding light on its clinical significance for humans and horses.

5.5.8 I OWN A SELF-DRIVING CAR

Ryan Eubanks
(Arup Ghosh– Mentor)

A self-driving car can be beneficial for most of us including busy college students. It can help students save time by getting them to and from classes and activities more quickly and efficiently. Additionally, a self-driving car can help reduce their stress levels by taking on the task of driving themselves around campus. This can be especially beneficial for students who have a lot of activities and commitments outside of class. Finally, it can help save money by eliminating the need for a parking permit since the car could just drive back home reducing the number of cars around campus. As fully self-driving cars are not yet available for purchase, and it's also uncertain if they will be affordable for the general public, I have decided to build a simulated self-driving car for myself with my advisor's help. In this demonstration, I will show you the car I built and how it helps me go to places navigating through a virtual environment, highlighting the current state of self-driving car technology and its potential impact on the transportation industry.

5.5.9 FLOOD HAZARDS ON TRAILS

Allie Field
(Ross Martin – Mentor)

In the Appalachian Province more than three million visit the Appalachian Trail each year, “Approximately three million people visit the Trail every year”. (Media Room). The severity of some areas with flooding leads a risk of landslides, erosion, falling trees, and even more. This puts hikers at risk, not even knowing when a natural disaster could occur while on the trail. With the use of DEM (Digital Elevation Model) and Arc Hydro Tools, and past reported areas of flooding we can see where flooding may occur again.

5.5.10 THE USE OF XENOPUS EMBRYOS FOR DETERMINING THE DEVELOPMENTAL TOXICITY OF ACID FUCHSIN.

Vaderick Fowler
(James Rayburn – Mentor)

Acid fuchsin is a dye that is used in materials such as textile fabrics, silk, nylon, wool, and leather. These materials may pollute the water, due to synthetic dye pollution. This pollution can be harmful to the animals in these environments. Amphibians are aquatic organisms that are sensitive to harmful pollutants and there has been a large reduction of amphibian populations in the past 40 years. To determine if acid fuchsin can potentially cause developmental effects to amphibians the Frog Embryo Teratogenesis Assay -*Xenopus* (FETAX) was used. This assay uses early-stage frog embryos exposed for 4 days (96-hrs) in various concentrations of acid fuchsin. During this time they develop from an early-stage cell blastula to a free-living tadpole. Plastic petri dishes of embryos in 8 MLs of test solution was used as the experimental unit. Four controls and 2 replicates for each concentration were used. Every 24 hours dead embryos were removed, and solutions were renewed. At the end of the four days mortality, malformations and embryo length were recorded. Means, Standard error, probit analysis (for LC50 and EC50(malformation)), ANOVA and Bonferroni's post hoc test were calculated using Systat. The teratogenic potential was calculated using the formula 96-hr LC50/96-hr EC50(malformation). The 96-hr LC50 was >1000 and the 96-hr EC50(malformation) was approximately 120 mg/L. At the high concentrations length was significantly affected. Also, there were severe malformations of spine, eye and gut. These preliminary results indicate that acid fuchsin may be teratogenic and further testing is needed.

5.5.11 AIR POLLUTION AND ASTHMA EQUITY INDEX IN ALABAMA

Tim Gaskins
(Saeideh Gharehchahi – Mentor)

One of the most important environmental problems that is threatening public health is air pollution. In some regions of the world, this issue is becoming a severe health risk due to uncontrolled industrial activities, consumption of fossil fuels and population density. Air pollution can lead to premature mortality, cardiovascular disease, bronchitis, asthma, and cancer especially in vulnerable population groups. Therefore, evaluation of demographic data related to air pollution and social equity among communities is a necessary component of responsible governmental policy interventions. Here, this study aims at analysis of the spatial and temporal of air pollution and population data in Alabama to assess the social and racial equity in communities. Initially, a spatial database consisting of air pollution parameters and demographic data were collected and the spatial-temporal relationships between the air pollution and demographic data was analyzed and mapped to prioritize the populations at risk across the state of Alabama.

5.5.12 DETECTING GLOBAL DECLINES OF STONEFLIES AT A LOCAL SCALE: MEASURING CHANGES IN STONEFLY DIVERSITY IN A TRIBUTARY OF THE CAHABA RIVER OF CENTRAL ALABAMA

Gabriella Gentry
(Lori Tolley-Jordan – Mentor)

Projections of a global 40 percent decline in overall insect diversity in the next few decades are particularly worrisome for stonefly (*Plecoptera*) diversity. This group contains many species that are endemic, sensitive to habitat loss, and pollution intolerant primarily in their aquatic life stages where they occur only in non-impaired waterways. These insects often have life cycles of at least a year before emerging as adults so chronic exposure to pollutants, siltation, scouring, and other trends in impaired waterways cause localized extinction events. Currently, there are 650 described species in nine genera of stoneflies in the US of which 107 species are found in Alabama. In fact, type localities of 21 species are from small streams throughout the state. The headwaters of the Cahaba river starts in a very urbanized area and becomes more rural as it flows the almost 200 mile stretch away from Birmingham. Increased development at the headwaters is likely causing reduced stonefly diversity in the river as it becomes more impaired. Previously, 10 genera in four families were found along the Cahaba. A comparison of stonefly taxa along a single tributary of the Cahaba river from surveys conducted in 5 sites along the length of the creek from 1993-2018 will show trends in diversity changes through time and highlight the importance for long-term monitoring of Alabama streams.

5.5.13 IMAGE PROCESSING IN PYTHON

Matthew Glavosek
(Monica Trifas – Mentor)

Design is concerned with how things work, how they are controlled, and the nature of the interaction between people and technology. When done well, the results are brilliant, pleasurable products. When done badly, the products are unusable, leading to great frustration and irritation.

When coming up with new ideas as part of a design project, it is important to conceptualize these ideas in terms of what the proposed product will do. This is referred to as creating a proof of concept. A proof of concept can be seen as an initial pass to help define the area and explore solutions. One reason for needing this is as a reality check where fuzzy ideas and assumptions about the benefits of the proposed product are scrutinized in terms of feasibility: How realistic is it to develop what a team of designers have suggested, and how desirable and useful it will actually be? From the user experience (UX) perspective, it can lead to better clarity, forcing designers to explain how users will understand, learn about, and interact with the product.

In the recent decades, design has gotten better. We have excellent books and courses on human-centered design. The rapid rate of technology change outpaces the advances in design. New technologies, new applications, and new methods of interaction are continually arising and evolving. New industries spring up. New developments may repeat the mistakes of the earlier ones; new fields require time to adopt the principles of good design. Each new invention of technology or interaction technique requires experimentation and study before the principles of good design can be fully used in practice.

In the proposed project, we will introduce proper terminology and analyze interaction styles- the “bread and butter” of user interfaces. We will present our implementation (using PYTHON) for projects that solve similar problems but display the results using various approaches.

5.5.14 EXPRESSION OF H284Y VARIANT OF TCF4 IN THE EXPRESSION OF PITT-HOPKINS SYNDROME

Macee Glick
(Jenna Ridlen – Mentor)

TCF4 is a gene that is presumed to give rise to the rare genetic disorder, Pitt-Hopkins Syndrome. This syndrome is characterized by severe intellectual disability, developmental delays, breathing problems, recurrent seizures (epilepsy), and distinctive facial features. The specific variant of TCF4, H284Y was studied in order to determine the pathogenicity of the variant and its expression in Pitt-Hopkins Syndrome. By utilizing various databases and algorithms such as NCBI's Clinvar, Uniprot, and PolyPhen-2, the pathogenicity of the H284Y variant could be inferred. Homology modeling and other dynamic simulations were then run to better understand changes in the way the wildtype protein and the variant interacted with their environment.

5.5.15 USING MACHINE LEARNING TO PREDICT LAPTOP PRICE

Sudeep Joshi
(Arup Ghosh – Mentor)

Machine learning (ML) allows computers to learn from historical data and make decisions without being explicitly programmed. It can be used in speech recognition, image processing, recommender systems, natural language processing (NLP), healthcare, etc. In this presentation, I will discuss a machine learning model that we built to predict the price of a laptop given its specifications, as estimating an accurate price could be a challenge. A laptop price estimator can be particularly helpful for consumers, especially first-year college students, looking to purchase a new or used laptop, and for sellers looking to sell their used laptops to get an estimate of the fair market value of their device. We used the “Linear Regression model”, one of the most widely used ML algorithms, which takes given specifications as features and outputs the price as the label. The data used to build the model was downloaded from Kaggle, a data-sharing website. To make demonstration easy during my presentation, I have created a web application using the Python “Streamlit” framework and integrated the ML model into it, and finally, deployed it on Render, a cloud hosting platform.

5.5.16 ECONOMIC IMPACT OF THE FORESTRY INDUSTRY IN ALABAMA: USING ECONOMIC GEOGRAPHY TO UNDERSTAND GEOGRAPHIC IMPACTS ON BUSINESS.

Annie Kelly

(Mark Sciuchetti and Jennifer Green – Mentors)

This research examines the economic impact of the Forestry Industry on the State of Alabama in 2019. IMPLAN methodology was used to estimate the economic impact of approximately thirty subsectors of the Forestry Industry in each of the sixty-seven counties within Alabama. The results of this state-wide examination of the economic impact data were spatially analyzed in ArcGIS Pro by creating an interactive choropleth map displaying key economic factors by county. By doing so, the locationality of how this industry is dispersed across the state is more apparent as it relates to the physical geography attributes of each county. This research is concluded by being communicated within the context of an ArcGIS Story Map, creating a digital story tale of the Alabama Forestry Industry in 2019.

5.5.17 DISCOVERIES OF FEATURE 904 AT THE BAINS GAP NATIVE AMERICAN VILLAGE SITE

Summer Kiker
(Kathryn Catlin – Mentor)

Since 1999, Jacksonville State University archaeology has been excavating at the Bains Gap Native American village site (1CA625), under the supervision of Dr. Harry Holstein and more recently Dr. Kathryn Catlin. The site is located near Anniston Alabama, southeast of the former Fort McClellan site and on the west side of Choccolocco Creek. This land is traditionally Muscogee Creek Territory. Artifacts collected throughout the many years of excavation seasons show evidence of prehistoric people inhabiting the area from the Paleoindian (15,000 BC- 8,500 BC) through Mississippian (700 AD- 1540 AD) periods. Features found show evidence of ditches, walls, post holes, and pits of various sizes. There are two stockade ditches which are parallel to each other encircling a portion of the village. The outer ditch, closest to Choccolocco Creek, has a parallel stockade post line. Based on the contents found in the ditches, the inner ditch is thought to be older than the outer ditch with the associated parallel post line. My work focused on feature 904, which is the inner ditch. This feature is extensive and was excavated over many years, from 2011 until 2018. By studying this ditch, I hoped to figure out what time period it was used and what it was used for. While studying the contents found in this ditch, I uncovered some interesting finds and data. Some of the finds include a piece of a Mississippian era face water bottle, a pipe, and different types of bifaces. The most common pottery temper found was limestone and the second highest was sand temper. There was very few shell and metasiltstone tempered pottery. The artifacts and the abundance of limestone tempered pottery led me to believe that the ditch is Woodland era and could have been used for defensive measures or water collection during that time. The site needs to be further excavated to better understand the use of the inner ditch and how it relates to the outer one.

5.5.18 GENETIC ASSESSMENT OF SYSTEMIC LUPUS ERYTHEMATOSUS ASSOCIATED TREX1 VARIANTS OF UNCERTAIN SIGNIFICANCE IN *C. ELEGANS*

Taylor Mabry, Jordan Peters, Marli Hanks and Auslyn Russell
(Ashley Turner – Mentor)

TREX1 is a human gene that encodes for a protein called 3'-to-5' DNA exonuclease. Mutations in TREX1 result in accumulation of unwanted DNA and RNA in the cell and have been shown to trigger immune dysfunction leading to diseases such as systemic lupus erythematosus (SLE) and Aicardi-Goutières syndrome. The goal of this project is to determine the potential impact of an SLE associated TREX1 missense variant of uncertain significance (VUS). Initially, a gene mutational analysis was carried out with 30 TREX1 variants associated with SLE with varying degrees of reported pathogenicity to examine the conservation of each variant in the TREX1 nematode ortholog W02F12.4. Of the 30 screened variants, 2 were found to be conserved in both TREX1 and W02F12.4. These TREX1 variants were c.197A>G (p.Lys66Arg) and c.226G>T (p.Ala76Ser), both of which have uncertain clinical significance. VUS c.226G>T (p.Ala76Ser) was selected for further investigation due to its proximity with a likely pathogenic and pathogenic variant. PolyPhen-2 analysis also predicted this VUS to be probably damaging with scores of 0.982 (HumDiv) and 0.953 (HumVar). These findings support further investigation of the potential impact of this VUS. Future experiments include generating a CRISPR-Cas9-engineered *C. elegans* model containing the TREX1 missense VUS in the nematode loci of W02F12.4 for in vivo assessment. Primers were designed and optimized to amplify the VUS region in *C. elegans* using polymerase chain reaction (PCR), gradient PCR, and gel electrophoresis. CRISPR RNA guides and a DNA repair template have been designed and will be used along with Cas9 protein for microinjection of nematodes to generate the mutant VUS strain. This will allow us to support or refute the potential pathogenicity of TREX1 c.226G>T (p.Ala76Ser) in vivo through phenotypic changes we observe in the mutant nematode compared to wildtype. This will help provide important insight into the potential clinical significance of this SLE associated TREX1 VUS identified in patients.

5.5.19 A PRELIMINARY COMPARISON OF METHYLENE BLUE AND PHLOXINE B'S DEVELOPMENTAL TOXICITY USING XENOPUS EMBRYOS.

Kritika Maharjan
(James Rayburn – Mentor)

Chemical dyes are one of the most commonly utilized chemical substances in our daily life, as they are found in food, textiles, and medications, resulting in high environmental exposure. Methylene blue (MB) and Phloxine B (Ph B), which are both used in textiles, food, and even pharmaceuticals, will be tested for teratogenic effects in this investigation. Methylene blue is most commonly used as a bacteriologic stain and indicator, whereas Ph B is usually utilized as an agar plate stain. Methylene blue has been demonstrated in recent research to produce severe central nervous system toxicity, as well as nitrogen and ammonia poisoning. Ph B is also an effective photosensitizer of cellular membrane damage, meaning skin exposure to the dye and sunshine or artificial light may result in phototoxicity. To better understand the adverse developmental effects of MB and Ph B, the Frog Embryo Teratogenesis Assay – *Xenopus* (FETAX) was performed to assess the developmental toxicity. FETAX is a 96-hour test that measures the potential of chemicals to induce death, deformity, and growth inhibition in developing embryos using early-stage embryos of the South African clawed frog (*Xenopus laevis*). The objective of this study is to determine the potential developmental toxicity of MB and Ph B. To assess the photoactivity, the Ph B trials were carried out in both light and dark settings. Fertilized embryos were separated for the studies and allowed to develop in test solutions. The LC50 (mortality), EC50 (malformation) for MB and Ph B (in light and dark) were determined using probit analysis. The Teratogenic Index (96-hr LC50 / 96-hr EC50) was calculated to determine the risk to amphibian embryos. Overall, the results indicate these dyes have the potential to cause malformations and risk to amphibian embryos.

5.5.20 THE WHAT AND HOW OF QR CODES

Barbara Moore
(Arup Ghosh – Mentor)

QR codes or Quick Response codes are a type of two-dimensional barcode that can store and help share information. In this presentation, I will be explaining the technology that is used behind QR codes including how they are created and read. I will also discuss how they can be used in different fields, including higher education, marketing, advertising, logistics, inventory management, etc. Everyone attending this presentation will be getting a better understanding of the capabilities and limitations of QR codes.

5.5.21 LOCKDOWN

Kevin Navarrete-Resendiz, Jakob Skipper and Adam Parker
(David Thornton – Mentor)

Our group for this project is made up of three 3 students named Adam Parker, Jakob Skipper, and me, Kevin Navarrete. We collaborated in Game Design 2 to create a VR horror game, which we call Lockdown. When we first started our development for the game, we decided to make it a VR game since we had more tools with Unity as our game engine and knew a horror game would be a good project. It's a game of cat and mouse, not literally, where the player has to navigate throughout a school alone, while an enemy is pursuing them the entire time. During our presentation, we want to not only just demonstrate the game the entire time but also spent a good portion of it discussing about the progress and obstacles we went through when we developed the game. We want to specifically talk about how each of us were working on different aspects of the game like design, programming, adaptability, suggestions, and other different characters. And for some difficulties we will discuss, we will be focusing on the issue of transitioning a build or program between each of our computers to also be playable with VR, since none of us had their own VR to test the game on our own time. But we believe and know that it was a fun experience creating this game and even rewarding with the product, just as the time previously worked together in Game Design 2. As of writing this abstract, not everyone will be present at the demonstration, so we hope to speak and represent each other to the best of our ability.

5.5.22 SCP-5999 (A VR HORROR GAME)

Montell Norman, Megan Kamholtz and Martell Norman
(David Thornton – Mentor)

My presentation for JSU Student Symposium is about a Virtual Reality video game my team and I made in Game Design II last Fall of 2022. Virtual Reality is a computer-generated simulation that allows users to experience a 3D environment of any type from simulations of rock climbing to learning about operating surgeries, VR has many applications that any user can use it for. For video games, game developers utilize VR to create groundbreaking experiences to immerse the player in their environment. Video games are a type of entertainment medium that allows people to escape from the real world and immerse themselves into worlds and stories to play out their fantasies and relax as well.

For our VR games, we decided to utilize the immersive aspect of the device to design and create a horror game based on a fictional Sci-Fi horror series called SCP. SCP is a horror series that writers on the internet create plausible anomalies that can exist in the real world, but fictional of course. For example, one of many anomalies that were created for the website where these stories are stored is one where the famous game Where's Waldo is an entity that attacks and kills its victims when spotted. Our game is based on SCP-5999 where the player must find seven notebooks, 3 in our game as of the current build, and by doing so the entity will jumpscare the player by the final note and the game ends.

5.5.23 ONLINE THREATS VS. MITIGATION EFFORTS: KEEPING CHILDREN SAFE IN THE ERA OF ONLINE LEARNING

Tiffany O'Dell
(Arup Ghosh – Mentor)

As the COVID-19 pandemic resulted in school closures since early 2020, children have spent more time online through virtual classrooms using educational technology (EdTech) and videoconferencing applications. This increased presence of children online exposes them to more risk of cyber threats. Here, we present a review of the current research and policies to protect children while online. We seek to answer four key questions: what are the online threats against children when learning online, what is known about children's cybersecurity awareness, what government policies and recommendations are implemented and proposed to protect children online, and what are the proposed and existing efforts to teach cybersecurity to children? Our study emphasizes the online risks to children and the importance of protective government policies and educational initiatives that give kids the knowledge and empowerment to protect themselves online.

5.5.24 EXPLORING PERFORMANCE EVALUATIONS OF DOCKER AND LXC CONTAINER TECHNOLOGIES – ARE THEY GOOD FOR CLOUD ENVIRONMENTS AND IoT DEVICES?

Mausam Parajuli and Syed Shah
(Arup Ghosh – Mentor)

The internet has brought a significant change in the modern world in terms of advancement in technologies. We exchange data and applications with other systems on a regular basis via the internet. These all are connected to a network (internet), and we call it the Internet of Things (IoT). There are enormous applications running every second, and they can be built, deployed, and managed using containers. Using container virtualization has been very famous recently in cloud environments and IoT because they are lightweight and can be deployed in many Operating Systems where applications are platform independent. Some of the popular container technologies are Docker and LXC. Container-based virtualization improves performance and uses resources efficiently. This paper studies the use cases of container virtualization in Cloud environments and the Internet of Things, reviews other researchers' work on container technologies and reports our findings in the context of containers for Cloud and IoT scenarios.

5.5.25 GENETIC ANALYSIS OF HEREDITARY GINGIVAL FIBROMATOSIS ASSOCIATED SOS-1 MISSENSE VARIANT OF UNCERTAIN SIGNIFICANCE IN CAENORHABDITIS ELEGANS

Himani Patel
(Ashley Turner – Mentor)

Hereditary gingival fibromatosis (HGF) is a disorder that leads to fibrous gingival overgrowth in the mouth. Researchers have identified that genetic mutations in the SOS-1 gene can be responsible for HGF. The goal of this study is to examine the potential impact of an HGF associated SOS-1 missense variant of uncertain clinical significance (VUS). Studies in *C. elegans* have revealed the nematode ortholog *sos-1* which allows comparative studies. We examined the evolutionary conservation of missense SOS-1 variants across human, *C. elegans*, and other species. A SOS-1 VUS was identified through ClinVar to be conserved across human, *C. elegans*, and other species. Multiple sequence alignments were carried out using Benchling. The conserved missense VUS occurs at SOS-1 c.3793T>G (p. Ser1265Ala). The VUS leads to an amino acid class change from polar serine to nonpolar alanine that might result in a change in the encoded protein's structure. Current bioinformatic experiments underway include a gene mutational analysis, PolyPhen-2 analysis, and protein modeling to explore the potential pathogenicity of the VUS. If these findings support further investigation, we will examine the VUS in vivo through *C. elegans*. Future experimentation would include designing primers to amplify the VUS region in *C. elegans* *sos-1* using polymerase chain reaction (PCR) and a CRISPR RNA guide to target *sos-1*, microinjection of CRISPR-Cas9 reagents to generate the VUS-*sos-1* *C. elegans* model, and screening and phenotyping of the identified VUS model. This study aims to provide an assessment of the HGF associated VUS shedding light on its clinical significance.

5.5.26 CLOUD COMPUTING AND ITS ROLE IN EDUCATION DURING COVID-19 PANDEMIC

Jhanvi Patel, Josemanuel Mendez and Sajana Vangala
(Monica Trifas and Arup Ghosh – Mentors)

The COVID-19 pandemic, the sudden outbreak, had severely affected every area of life all over the world. The lockdown imposed to get control on the novel corona virus has interrupted the people's routine and working life and were forced to work from home. Every field including medical, entertainment, companies, industries, education switched to the online medium for work. Cloud computing (CC) was one of the emerging technologies in the pandemic and is still evolving and this change of working style has led to the adaptation and increased use of CC technology at its best with a significant impact in each working field. One of the fields that have a significant impact of CC was/is education. Our study is based on the impact of CC as a solution to the education where we have considered using qualitative research methodology to be conducted on the existing literatures, approaches proposed by the researchers and a survey conducted on the students and faculty members of JSU (Jacksonville State University). The result shows multiple factors affecting the students and universities to adapt e-Learning applications where the most concerning factors were security and privacy. The study also shows the advantages and challenges associated with the cloud computing for education sector.

5.5.27 INCOME INEQUALITY DISTRIBUTION OF THE RESIDENTS OF CITY OF JACKSONVILLE, ALABAMA USING GINI INDEX AND LORENZ CURVE

Daythyn Price, Kris McAnally and Adam Parker
(Kazi Rahman – Mentor)

The Gini index and Lorenz curve are used to measure the distribution of income among the inhabitants of any given region. The Lorenz curve is represented as $y=L(x)$ on the interval $[0,1]$ by plotting the point $(a/100, b/100)$ on the curve if the bottom $a\%$ of households receive at most $b\%$ of the total income. Whereas the Gini index (sometimes called the Gini coefficient or the coefficient of inequality) is the area between the Lorenz curve and the line $y=x$. We estimate the Gini index for the income inequality distribution of the residents of city of Jacksonville, Alabama using a quadratic and Lagrange polynomial model for the Lorenz function.

5.5.28 GENSHIN IMPACT: A CASE STUDY OF VIRTUAL BIOGEOGRAPHY

Tabitha Rayburn
(Vicki Tinnon-Brock – Mentor)

Place can be defined by different definitions. 'a space or location with meaning' and 'an area having unique physical and human characteristics interconnected with other places.' Just to name a couple. It is my belief that place is not just based in the physical world. Places have been built through literature, like with JRR Tolkien's Lord of the Rings, Places have been built for television such as Nickelodeon's Avatar the Last Airbender or Babylon 5. Video games are no different. We have simplistic places like the maze in Pac Man and it has since evolved into 'open-world' style's like our subject, Genshin Impact.

What makes a place believable in fiction is the immersion, the transition from what we know, to what we expect. When you are put into a scenario involving aliens you expect to see alien people, and alien foods. When you're placed into a fantasy you look for the familiar and hope to see differences. Genshin Impact is an open world game created by Mihoyo. This game has the regular aspects of an open world such as fighting a variety of enemies and having different playable characters. This game offers more immersive actions like the ability to cook and using a fantasy element called alchemy to create items to enhance your performance in the game. While researching this topic I examined the differences via the lens of familiarity such as specific location of flora, or soil requirements to farm (and more).

Where things get interesting is the means of gathering the items to utilize these crafting methods. Because for a potion you might need a stone called Cor Lapis, a stone you can only find in the country of Liyue. Or perhaps you need to make a soup that requires calla lilies, you can only find those in the northern country of Mondstat. These type of region locked items may seem like deliberate choices to limit players, but there is evidence that there is conscious biogeographic elements being displayed. There was once a quest to gather region locked items for experience points. On the surface it may seem superfluous, but it is our belief that this game encourages biogeographic exploration with the hidden lesson of understanding natural dispersion of resources!

We wanted to explore this more, analyze the resource locations and find any logic behind the placement of these artificial species. From in game research, mapping and analyzing the literature of the game a lot of questions about the flora and fauna can be answered through geography.

5.5.29 TREMATODE DIVERSITY IN FRESHWATER SNAIL, *CAMPELOMA DECISUM*

Matthew Reeves

(Lori Tolley-Jordan – Mentor)

The highest diversity of freshwater snail in North America is found in Alabama. Remarkably, most freshwater snails are host to at least one species of parasitic flatworm; yet most of these relationships are poorly documented. One species of freshwater snail, *Campeleloma decisum*, is widespread in Alabama but few studies have reported the diversity of parasites associated with this species. Here, I sampled a population of these snails in a spring system in Anniston, AL in January 2021 and monthly July through October. During each sampling event I collected at least 50 individuals that were sacrificed, and tissues were observed under a microscope to detect infection. On average at least 50% of sampled snails (usually 50 individuals) were infected with parasites. In addition, two parasite species were found in this species in this one spring system. Interestingly, these parasites have a complex life cycle in which additional life stages will infect other animals, such as birds and fishes. However, parasites in snail tissues can be difficult to identify so that understanding the life cycle of the parasite is not possible. With the aid of ongoing genetic analyses, I will be able to identify these parasitic flatworms to lowest taxonomic level and understand the other hosts involved in these complex life cycles.

5.5.30 INVESTIGATION OF BMAA MODULATION OF A β -MEDIATED NEURODEGENERATION IN TRANSGENIC *CAENORHABDITIS ELEGANS*

Tanner Vandever, Alexis Petty and Elise Patrick
(Ashley Turner – Mentor)

β -N-methylamino-L-alanine (BMAA) is a nonprotein amino acid and neurotoxin originally isolated from seeds of a cycad plant in Guam and produced by blue-green algae or cyanobacteria. BMAA has also been shown to bioaccumulate through food chains. Alzheimer's disease (AD) is a progressive neurological disorder characterized by the deposition of amyloid beta (A β) in the brain. Recent studies suggest that chronic exposure to BMAA might trigger neurodegenerative diseases in susceptible individuals, including AD. In this study, we aim to examine the potential neurotoxic modulation of BMAA on A β -mediated neurodegeneration in transgenic *Caenorhabditis elegans*. We propose to utilize a *C. elegans* AD strain with pan-neuronal human A β 1-42 expression that displays neuromuscular defects, shortened lifespan, and age-dependent behavioral dysfunction. Neuromuscular function and lifespan will be measured utilizing a thrashing assay (n = 20 per group) and solid agar lifespan assay (n = 100 per group). Experimental groups will include N2 wildtype control, transgenic A β 1-42 expressing strain, and the transgenic control. Each experimental group will be treated with BMAA or vehicle control. This study proposes to gain more insight into the effect of BMAA on A β -mediated neurodegeneration in a *C. elegans* AD model. It is important to begin to unravel and understand the potential impact of environmental toxins on complex neurological disorders.

5.5.31 USING ARCGIS SOFTWARE AND APPLICATIONS FOR COMMUNITY MAPPING

Margaret Walton
(Mark Sciuchetti – Mentor)

Noccalula Falls Park and Campground is located in Gadsden, Alabama just off Noccalula Road and nuzzled right in the foothills of the Appalachian Mountains. This park is owned and maintained by the City of Gadsden Parks and Recreation Department. The Director of the park and the Fire Chief of Gadsden both knew that there was an issue with trail markings, leading to various injuries and a few lost hikers and cyclist along the way. They had a plan but needed someone to help execute the idea by creating higher quality and more accessible maps for emergency responders and the public. We planned to mark the trails with identification placards, do minor trail maintenance in the process, and map the end results. ArcGIS Quick Capture was used to collect point data – the placards and their latitude, longitude, number, trail name, and abbreviation. ArcGIS Online was used to combine previous layers with the layer created with Quick Capture. Parts of this data are highlighted in an ArcGIS Online Story Map with the intention of creating more interactive Story Maps in the future. A series of maps were created to represent the Black Creek Trail System, various access points, and other areas of interest to assist Emergency Personnel in the City of Gadsden.

5.5.32 HOW AN INVASIVE ASIATIC CLAM SPECIES EFFECTS THE MORPHOLOGY OF STERNOTHERUS ODORATUS

Anthony Wapshott
(Grover Brown – Mentor)

Food availability is an important factor in growth, maintenance and reproduction of any organism in an environment. Some turtles are able to capitalize on hard-shelled prey items through modification and hypertrophy of the skull. One such species is the eastern musk turtle (*Sternotherus odoratus*). We were interested in the morphological differences between two populations of musk turtles along the Cane Creek waterway in Anniston, Alabama. One site was a small impoundment on the creek itself, another site was Finks Pond, a large pond alongside the creek. The stream site had abundant mollusk prey (snails and clams) whereas the pond lacked these hard-shelled prey items. We were primarily interested in the cranial morphology between the two populations. We captured a total of 37 *Sternotherus odoratus* across the two sites, collected morphometrics and analyzed diet contents. While we were not able to directly assess changes in the head morphology between populations, we did find that females from the Cane Creek site were significantly larger than all other musk turtles, regardless of sex and location. Diets of these females were nearly exclusively composed of an invasive Asiatic clam (*Corbicula fluminea*), suggesting this prey item subsidized the diet, size and morphology of female turtles at the Cane Creek site. Future studies are important to understand these ecological implications (e.g., if the larger females are more fecund than females at lake sites with poorer food quality).

5.5.33 A COMPARISON OF *XENOPUS LAEVIS* AND *AMBYSTOMA MACULATUM* EMBRYOS FOR DETERMINING THE DEVELOPMENTAL TOXICITY OF SODIUM FLUORIDE AND SODIUM SELENATE

Shelby Wolfram
(James Rayburn – Mentor)

Amphibians are often the main vertebrate group at risk of exposure to contaminants in ephemeral systems (Mann 2000). Both model species and native species are used for determining risk to amphibians. *Xenopus laevis* is a model species for development toxicity and has been used successfully for estimated the developmental toxicity of chemicals and mixtures. Their embryos are transparent which allows the observation of malformations. *Ambystoma maculatum* is a native salamander that has been shown to show promise as species that can be tested in the lab. *Xenopus* and *Ambystoma* were used to determine the toxicity of sodium fluoride and sodium selenate. Sodium fluoride is an environmental pollutant source widely existing in nature. Sodium selenate can be found in nature as organic and inorganic forms and is used in fertilizer, insecticide, and fungicide. The assay uses multiple serial dilutions to determine how toxic the chemicals could be to the amphibians. *Xenopus* assay lasts 96 hours while *Ambystoma* assay lasts 12 days. Within the assay, 20 embryos for *Xenopus* were placed in small petri dishes. *Ambystoma* uses 10 embryos in large deep petri dishes. Throughout the assay mortalities were counted for each day. Mortalities and Malformations were counted on the last day of the assay and embryo length were measured. Means, Standard error, probit analysis (for LC50 and EC50(malformation)), ANOVA and Bonferroni's post hoc test were calculated using Systat. The teratogenic potential was calculated using the formula 96-hr LC50/96-hr EC50(malformation). Selenate was more toxic than fluoride. However, high concentrations of fluoride exposed embryos die earlier than selenate exposed embryos. These assays will help prove the toxicity levels of sodium fluoride and sodium selenate towards amphibians.

5.6 COLLEGE OF SOCIAL & BEHAVIORAL SCIENCES

5.6.1 HOW IS EMPATHY CORRELATED WITH THE BIG 5 PERSONALITY TRAITS?

Gracie Dooley
(Heidi Dempsey – Mentor)

In this study, we correlated the Ferguson Empathy Scale (FES) and the empathic concern and perspective-taking scales of the Interpersonal Reactivity Index (IRI) with the Big Five Inventory (BFI) (John et al., 1991). Consistent with previous research looking at empathy and the Big 5, we expected the strongest relationship to be with agreeableness followed by openness (Antinori et al., 2017; Del Barrio et al., 2004). This is because empathic people care about others and are also more motivated to explore the world visually and cognitively (e.g., Koivisto et al., 2021). Although other studies have occasionally found correlations with the other Big 5 factors of extraversion, neuroticism, and conscientiousness, these correlations appear small and sporadic. Thus, we did not predict empathy to be correlated with these scales. Undergraduate students (N = 426) completed the FES, IRI, and Big Five Inventory for extra credit. Overall, most identified as female/woman (67%), were first-year students (62.4%), and white/Caucasian (80.3%). FES empathy, IRI empathic concern, and IRI perspective-taking were most strongly related to agreeableness and openness but unrelated to extraversion, neuroticism, and conscientiousness. Thus, the hypotheses were supported and my discussion will explore these ideas further along with possible limitations.

5.6.2 RELIGION, RACE, AND RIGHTS: AN ANALYSIS OF THE POLITICAL AND ECONOMIC ATMOSPHERE OF THE SOUTHEASTERN UNITED STATES FROM 1776 TO 2022

Dakota Heathcock
(Lori Owens – Mentor)

There is no doubt that the Southeastern United States has played host to some of the most influential, controversial, and polarizing moments in American history. From the secession of the Confederacy to Jim Crow laws to Reagan-country to the heartland of the MAGA movement, the South has always had its own brand of politics and opinions. But are these underlying political opinions the only or even the major contributor to these moments and milestones? This piece examines the political attitudes that have existed in the South across the existence of the United States, as well as the sociological, religious, and economic attitudes and atmospheres that have existed. Furthermore, this piece investigates the possible connections and contributions that these aforementioned factors have played in the composition, restructuring, and continuation of the uniqueness in the realm that is the Southeastern United States. Some major milestone time periods examined are the Revolutionary War, the United States Civil War, The Civil Rights Era, and from the 1970s into the modern era.

5.6.3 BARRIERS TO JUSTICE: THE NEED FOR AMERICAN PRISON REFORM

Madalyn Stott
(Jody Long – Mentor)

In the modern era of American politics, where citizens and politicians alike tout the long-held constitutional ideal of all men created equal, we see a dissonance surrounding vulnerable populations within the sphere of criminal incarceration. Within this system, minority and marginalized groups experience the consequence of predatory policies regarding non-violent offenses and unjust practices. Because of this history of discrimination—often beginning in childhood— social workers and other helping professionals must use their skills and disciplines to explore the reality of prison reform and the effects of the prison pipeline, the war on drugs, the economically disadvantaged, etc., on our communities. Through exploring facets of social work scope of practice, it is desired that these historically oppressive practices no longer prey on and reap the benefits of human exploitation. By completing a systematic review of the literature to survey the current and available sources of information, areas with insufficient consideration can be recognized, and further analysis can be created. This demonstration aims to evaluate recent research and rhetoric on the topic of the American corrections system regarding non-violent incarceration and racial bias and education on tangible efforts that can be made by social workers.

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